

separate cars for purpose of coupler inspection it is certainly not practicable. . . .

"So far as the automatic features are concerned, the vertical plane does not possess these to any greater extent than does the improved link and pin coupler, which this company is using. . . .

that under the conditions the lateral movement required by the couplers on 12° curve was about 13 in. The close couplers, and the yokes in which they were enclosed, did not permit this, hence the derailments. There are numbers of cars in service at present laboring under the conditions above stated. Excessive rail wear

unable to obtain any promise of delivery under six months. Inquiries made of two American bridge builders, however, brought a reply from one of them promising to deliver the structure complete in New York in seven weeks. This offer, made by the A. & P. Roberts Company, of Philadelphia, was accepted.

In order to show that the order came to this firm unsolicited and that it was secured mainly on promise of short delivery, and also to correct the repeated assertion that the bridge was made from standard drawings and that secret information had been given to this firm at an earlier date to enable them to prepare designs, etc., the following summary of dates and data is given:

Summary of Dates and Data from Preliminary Negotiations to Final Shipment.

Jan. 7, 1899.—First cablegram received, asking for price and delivery on seven 150-ft. spans, narrow gage railroad; American standards.

Jan. 7, 1899.—Answered, giving price, with promise of seven weeks' delivery in New York, possibly six. Sent standard plans.

Jan. 13, 1899.—Cable received giving information that no falsework would be allowed in the river and that the trusses must be designed as cantilevers for erection purposes.

Jan. 14, 1899.—Answered, agreeing to change and asking for train load to prepare estimate on this basis, as standard plans could not be used.

Jan. 16, 1899.—Cable received giving train load.

Jan. 20, 1899.—Answered by cable, giving quotation based on this loading and cantilever erection.

Jan. 24, 1899.—Specifications received at Pencoyd.

Jan. 24, 1899.—Order for bridge received at Pencoyd.

Jan. 26, 1899.—Information received at Pencoyd changing span lengths to 147 ft. c. to c. end pins, and giving other important data.

Jan. 27, 1899.—Stress sheet made and sent for approval.

Jan. 28, 1899.—General drawing and sketches under way.

Jan. 31, 1899.—Shop drawings begun.

Feb. 2, 1899.—Order received for cast iron caps for piers.

Feb. 10, 1899.—Shop drawings finished.

Feb. 2 to 11, 1899.—Material ordered.

Feb. 3 to 21, 1899.—Material received.

Feb. 6, 1899.—Work begun in templet and bridge shops.

Feb. 13 to 20, 1899 (inclusive).—Works closed six days on account of blizzard.

March 7, 1899.—Total structure shipped from Pencoyd.

March 22, 1899.—One-half shipped from New York.

March 30, 1899.—Final shipment from New York.

April 26, 1899.—At 3 p. m., received cable to replace one chord section 25 ft. long, weight 3,200 lbs. [This piece was lost overboard during the transfer from one ship to another at London.]

April 27, 1899.—Shipped at 9 a. m. from Pencoyd (18 hours).

Erection Material.

March 2, 1899.—Received list of erection material to be furnished under separate contract. Shipped with permanent structure, March 7, 1899.

March 30 and April 15, 1899.—Received additional orders for erection material. Shipped at once.

April 21, 1899.—Erection crew sailed from New York.

General Design.

The structure, in brief, is composed of seven through, pin-connected spans 147 ft. c. to c. of end pins, resting on cylinder piers surmounted by cast iron caps; the spans to be erected without falsework. The Egyptian War Department is to furnish the substructure and the Pencoyd Iron Works (A. & P. Roberts Company) are to furnish the superstructure.

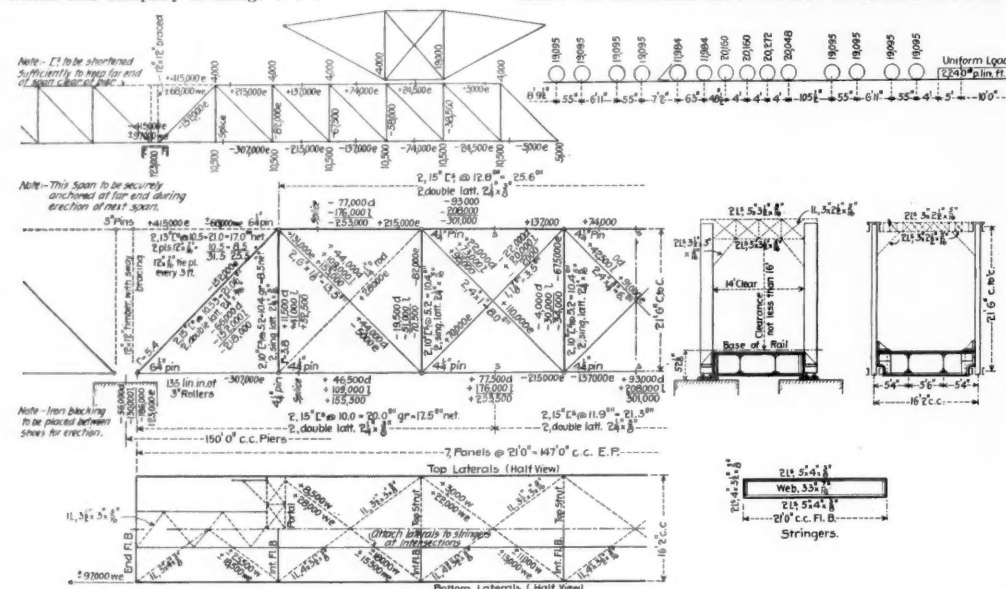


Fig. 1.—Stress Sheet, Atbara Bridge.

NOTE.—+ denotes tension.

d " " compression.
l " " stresses due to dead load.
w " " " " live " "
e " " " " wind " "
we " " " " during erection.
we " " " " wind stresses during erection.
r " " " " least radius of gyration.

Limiting stresses 9 gross tons per sq. in. on dead load and live load $\times 1.5$, provided that the dead load assumed shall never be less than half the live load.

Also 9 tons per sq. in. for erection.

Assumed dead load.

Track = 350 lbs. per ft. = 3,700
1 stringer = 2,300

6,000 per stringer.
Md = $\frac{1}{8} \times 6,000 \times 252 = 190,000$ Sheard = 3,000
1 = 1,700,000 1 = 31,000
1,700,000 $\times 2 = 3,400,000$ 31,000
31.2
+ 20,160 = 5.1.
215' $\times 4' \times \frac{3}{8}'' = 6.48$ gr. = 5.7 sq. in., net. No. int. stiff. L^s.

Intermediate Floor Beams.

End Floor Beams.

Shear d = 7,000 Sheard = 4,000
1 = 41,000 1 = 32,000
48,000 36,000

M = 82,000 $\times 64 = 5,250,000$.

+ 41.2 = 127,500.
+ 20,160 = 6.35 sq. in.
216' $\times 4' \times \frac{3}{8}'' = 7.2$ gr. =
6.45 sq. in., net.
Web, 43' $\times \frac{3}{8}'' = 16.1$ sq. in.
Ties 6' $\times 10'$, notched to 55%.

M = 64,790 $\times 64 = 4,100,000$.

+ 41.2 = 99,500.
+ 20,160 = 4.95 net reqd.
215' $\times 4' \times \frac{3}{8}'' = 6.5 =$
5.7 sq. in., net.
Web, 43' $\times \frac{3}{8}'' = 16.1$.

Assumed Dead Load for Permanent Span.

Track, 351 lbs. per ft. = 3,700 per panel per truss.
Floor, 345 " " = 3,800 " "
Trusses, 700 " " = 8,000 " "
1,475 15,500
4.0/10 top chord.
11.5/10 bottom chord.

Wind, 150 lbs. per ft. top laterals } Permanent
" 450 " " bottom laterals } structure.
" 150 " " top and bottom during erection.

Assumed Load for Erection.

Track, 250 lbs. per ft. = 2,700 per panel per truss.
Floor, 365 " " = 3,800 " "
Trusses, 760 " " = 8,000 " "
1,400 " " 14,500 " "

4,000 top.
10,500 bottom.
Weight of traveler and rigging = 30,000 lbs.
we = wind during erection 150 lbs. per lin ft. top and bottom.

on curves, rapid wear of wheel flanges, waste of motive power and occasional derailments bear undoubted evidence of these facts."

The Atbara River Bridge.

Toward the close of 1898 the Egyptian War Department decided to bridge the Atbara River on the line of the railroad now building in the Sudan. It was considered important to complete this work before the floods of July, 1899, i. e., in a period of six to eight months. The first design for the bridge was prepared in England and this design, together with tenders from several English firms, reached Egypt the latter part of December, 1898. It was then discovered that since the bridge as designed would have to be erected on falsework, it would, considering the character of the river, require two years to

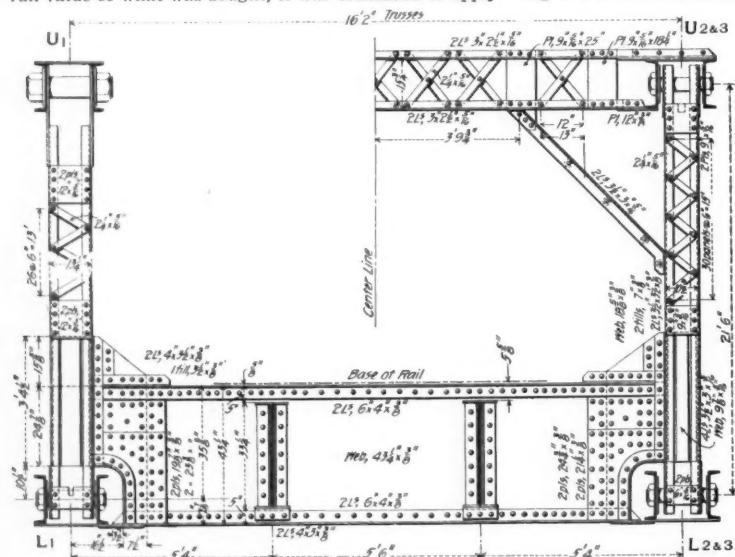


Fig. 4A.—Atbara River Bridge.

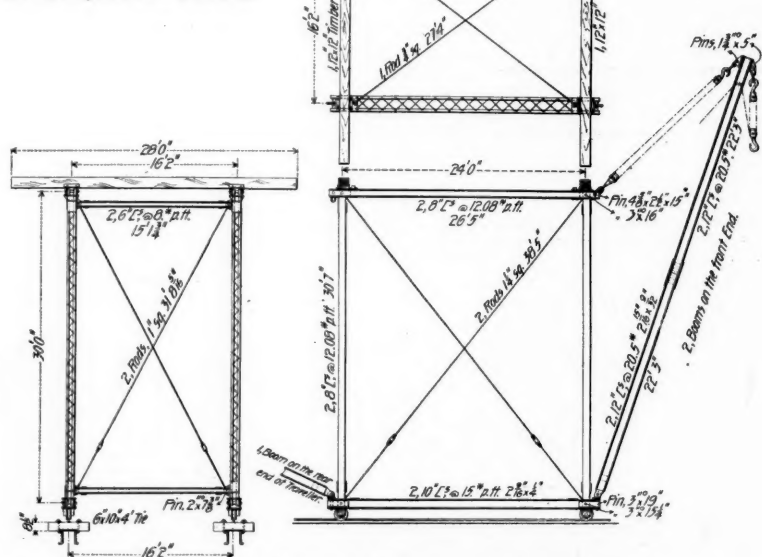


Fig. 2.—Diagram of Traveller, Atbara Bridge.

the same on the rear of tenders of engines hauling passenger trains. After placing the equipment in service, it developed derailments while passing sharp curves. The cause was found to be that the close coupling between tender and car did not permit sufficient lateral action for curve adjustment. My recollection now is

build it. As time was a matter of the greatest importance, the London agent was telegraphed to inquire of the English firms that had quoted for earliest delivery, whether they could supply a bridge that could be erected without falsework and offering a premium for early delivery. The agent was

ture and cast iron pier caps, also all expert erection force and the necessary erection plant and tools.

The one feature of the design that required very careful consideration was the method of erection without falsework and its effect on the permanent structure. It was clearly impossible to use any

standard plans for this work, as these were all designed with a view to using falsework for erection, the bottom chord being composed of eyebars, the top chord splices made for compression only, to

serve as an anchorage for span No. 1. For this purpose the embankment and back wall of the abutment were to be kept level with the bridge seat for a distance of about 155 ft.

was to be made by securely bolting cast iron blocks between the ends of the shoes which are planed to a square bearing. The roller end of the cantilever span was always to be placed against the fixed end

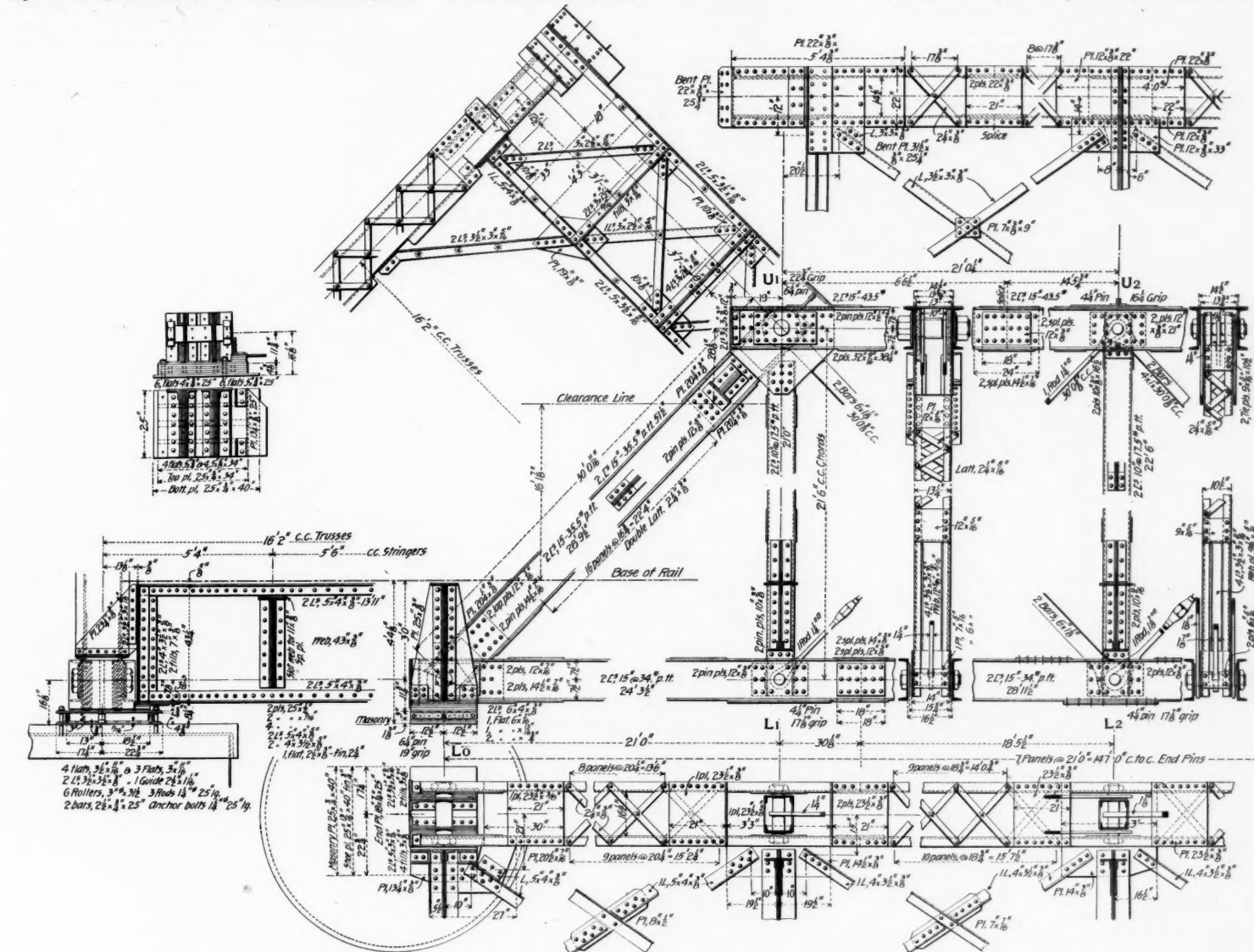
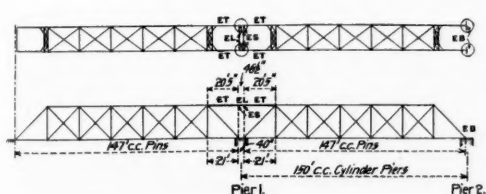


Fig. 4.—Details of the Atbara River Bridge.



A steel traveling derrick (shown in detail in Fig. 2) was to be erected on this span, running on rails which rested on short timber ties attached to the top chords. The temporary connection to take the horizontal pull between the anchor span and the span to be erected was to be made up of two 13-in. channels extending between the hip joints (U1) of the anchor and cantilever trusses, supported above the pier by two timber posts under each side. The

of the anchor span, for, if reversed, the entire thrust would come on the anchor bolts of the fixed shoe before any compression could take place in the bottom chord of the anchor span.

After making the connection over the pier the erection could proceed in the customary manner for cantilever bridges and the cast iron caps for the next adjoining pier be set as soon as the pier could be reached by the boom of the traveler.

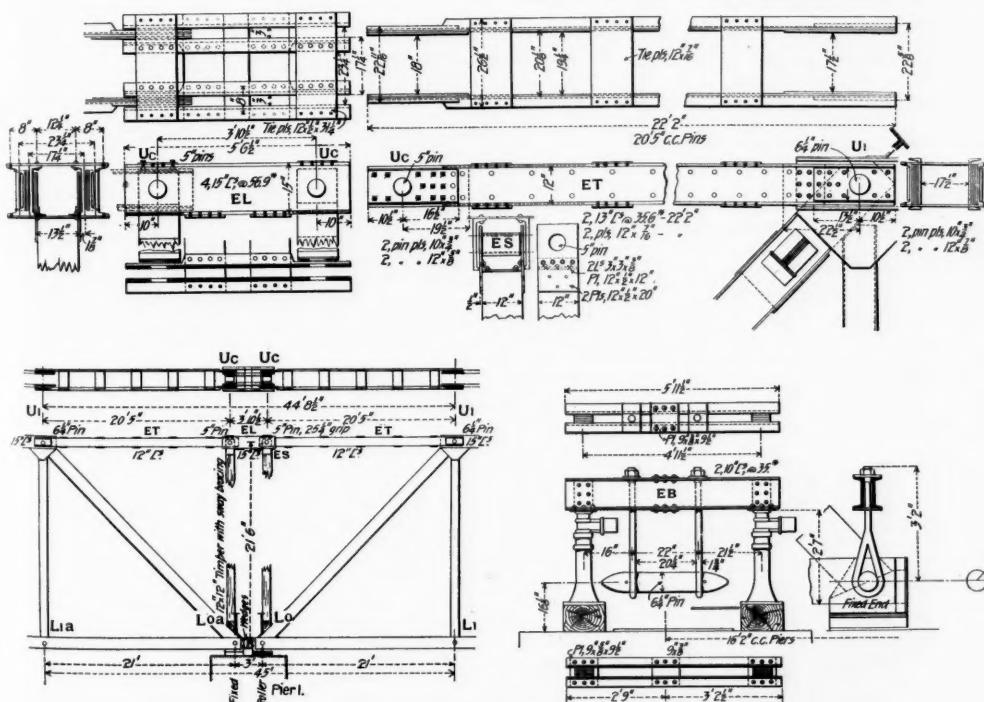


Fig. 3.—Details of Erecting Arrangements, Atbara Bridge.

gether with numerous other details which were incompatible with a cantilever design.

The general design is clearly indicated on the stress sheet, Fig. 1, and was outlined as follows: One span was to be erected temporarily on shore to

two channels are connected by tieplates, bolted to the flanges. The stiff tension members would also serve as a runway for the traveler between the two spans. The lower temporary connection between the two trusses to take the horizontal thrust

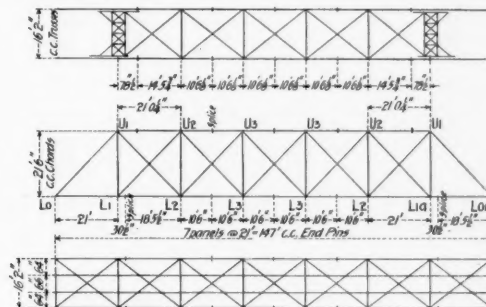


Fig. 4B.—General Diagram, One Span Atbara Bridge.

In order to provide for clearing the adjoining pier with the far end of the cantilever span hanging in space, the downward deflection of this end was figured, due to both the upward deflection of the anchor span and its own deflection and camber. The 13-in. channel ties between the anchor span and cantilever span were then shortened sufficiently to remove this deflection and to produce from 6 in. to 7 in. clearance above the pier.

After the cantilever span shall have been erected complete, it will be necessary to raise the far end of the span sufficiently to produce the necessary slack required to remove the temporary 13-in. channel ties between the spans and then to lower the end of the span safely to the pier. The jacks supplied for this purpose, together with the method of attaching them to the ends of the spans, are shown clearly in Fig. 3. This plate also gives a detail of the 13-in. temporary channel ties. After sufficient slack shall have been supplied to remove the temporary ties, these can be removed with the rear boom of the traveler, by removing the tieplates connecting the channels and taking them off the pins sideways,

leaving the pins at the hip joint (U.1) undisturbed, as the temporary tie is to be entirely outside of the truss.

The details of the finished structure are shown on Fig. 4, part of a general drawing made for record only after the shop drawings had been completed. The difference between this design and a standard design is at once apparent. The unusual arrangement of the joint at U.1, the stiff bottom chords, the unusual position of all chord splices, the heavy splices in top chords, the excessive counters and the heavy shoes with faced ends are among the most prominent special features.

Total weight of permanent steel work.....	1,258,313 lbs.
temporary steel work, including traveler	121,015 lbs.
" " " cast iron pier caps.....	129,586 lbs.
" " " duplicates and extras.....	4,000 lbs.
	1,512,914 lbs.

The Brooklyn Rapid Transit Company.

Mr. Clinton L. Rossiter, President, and his associates in the Brooklyn Rapid Transit Company, have succeeded in bringing together into one system and in a comparatively short time electric and steam surface and elevated roads aggregating 504 miles (single track), including incidentally the New York & Brooklyn Bridge. The companies comprising the system, as shown on the map, with the mileage and capital stock of each at the time of consolidation, is as follows:

	Mileage.	Capital stock.
Brooklyn-Union Elevated R. R. (Steam)	41.89	\$13,000,000 com. 5,000,000 pfd.
Brooklyn Heights R. R. (Cable)	1.27	200,000
Brooklyn City R. R. (Electric)	204.77	12,000,000
Brooklyn, Queens County & Suburban R. R. (Electric)	45.03	2,000,000
Nassau Electric R. R. "	129.70	850,000 com. 650,000 pfd.
Brooklyn & Brighton Beach R. R. (Electric)	17.86	500,000
Sea View R. R. (Electric)	2.2	190,752.54
Coney Island & Gravesend Ry. (Electric)	6.43	35,400
Sea Beach Ry. (Electric)	12.23	650,000

The following have been leased for 999 years:

	Mileage.
Prospect Park & Coney Island R. R. (Steam)	17.31
New York & Coney Island R. R. "	2.41
Prospect Park & South Brooklyn R. R. "	1.15

*Being changed to electric.

A contract has also been made with the Reorganization Committee of the Kings County Elevated Railway Co. and Fulton Elevated Railway Co. (representing 21.72 miles of steam elevated lines) whereby all the preferred and common stock of the newly organized company, which is to succeed to the properties, privileges and franchises of the old companies, is to be exchanged for \$2,000,000 of the stock of the Brooklyn Rapid Transit Co. Under the Reorganization Committee's plan the capital stock of the new company will be \$2,800,000 preferred and \$6,000,000 common, and the company will have an authorized bonded indebtedness of \$7,000,000 in 4% bonds, of which only \$5,000,000 will be issued, making the total fixed charges of the new company as acquired by the Brooklyn Rapid Transit Co. \$200,000 per annum.

In April, 1899, stockholders were given the privilege of subscribing to the extent of 7% of their holdings for Brooklyn Rapid Transit stock at par, the proceeds of this issue of stock being intended to be used in the acquisition of the Brighton Beach Railroad properties, and the electrical reconstruction of those properties, as well as of the leased properties of the Prospect Park & Coney Island R. R. and allied lines. The total amount thus issued was \$2,713,900.

The authorized capital stock of the Brooklyn Rapid Transit Co. is \$45,000,000, of which \$43,000,000 have been issued. The funded indebtedness of all constituent companies aggregates \$40,541,500, and the total interest and rental charges \$3,351,230.40, less interest on bonds owned, \$184,500, leaving the net fixed charges of the entire system \$3,166,730.40.

A study of the map will at once show the great proportions of the scheme, but its importance to both the traveling public and the properties concerned can only be realized by a description of the improvements to be made in connection with the consolidation.

With the rapid growth of electric roads in Brooklyn and the splendid service given by the Brooklyn City, Brooklyn, Queens County & Suburban and Brooklyn City & Newtown roads the earnings of the elevated roads decreased until it became apparent that some radical change must be made in order to put the latter on an earning basis. Two things were necessary; an improvement in service, particularly in a reduction in running time and an increase in train mileage, and a reduction in the operating expenses, both of which were possible only by a change of motive power.

The problem has been solved with the passing under the control of the Brooklyn Rapid Transit Company of the elevated properties; for not only will the changes necessary be made, and at a comparatively small cost (the present power plants of the Brooklyn Heights R. R., the operating company, being, with perhaps the addition of two or three units, or sufficient capacity to supply the elevated roads), but by giving up the elevated structures to quick service and leaving the local traffic to the surface trolley lines the rapid growth of the suburbs, especially in the direction of Jamaica, and increased traffic to the

pleasure resorts reached by the trolley electric lines are at once assured.

The steam surface road properties, now under control of the Brooklyn Rapid Transit Company, are the New York & Sea Beach, Brooklyn & Brighton Beach and Prospect Park & Coney Island, with trackage rights over a part of the Manhattan Beach Division of the Long Island R. R. The first named was acquired and changed to the overhead trolley system last year; the other three are now being electrically equipped with the same system. Parts of the elevated roads with which the surface railroads are either connected or are being connected are now undergoing a change to a third rail electric system.

When these changes have been made, which will be early next month, it will be possible to run through cars or trains, or express trains, operated by electricity instead of steam, as at present, from the Borough of Manhattan to West Brighton, Brighton Beach, Manhattan Beach and Jamaica. The running of express trains between the Brooklyn end of the New York & Brooklyn Bridge and Jamaica, over the Brooklyn Elevated and Long Island roads, was begun May 24. The distance between the two points is 11.28 miles and the running time is between 30 and 35 minutes, including from eight to ten stops.

Through trains, hauled by locomotives, have been run for about a year between Broadway Ferry, the terminus of the Broadway Division of the Brooklyn Elevated R. R., to Jamaica and Rockaway Beach via the Long Island R. R., and this plan will be carried out this season owing to the physical impossibility of equipping the lines with electricity in time for the heavy summer traffic.

During the summer open cars will be run on the elevated structures. The stations are being fitted for lighting by electricity and elevators will be built at certain stations to carry passengers to and from the street.

The surface lines heretofore controlled by the Brooklyn Rapid Transit Company had a very liberal transfer system (a daily average distribution of 150,000 in summer and 110,000 in winter), and it is doubtful if this will be extended.

The main work to be done in connection with the consolidation of the trolley electric roads is to establish an economical system for operation and bringing up to the high standard of the Brooklyn Heights R. R. the lines recently acquired.

There are now in Brooklyn but two other independent lines: The Coney Island & Brooklyn R. R., with a mileage of 54.13 and the Van Brunt Street & Erie Basin R. R., a short electric line of 1.25 miles.

Papers Read Before the Railway Superintendents' Association at Wilmington.

LOW RESISTANCE RELAYS.

The committee on low resistance relay experiments has continued the use of low resistance instruments during the year. In most cases the experiment has been to connect in multiple the coils of ordinary relays. An objection to this is the increased liability of the coils being burned out by lightning. Superintendent Green (Northern Pacific) has suggested that this trouble might be lessened if the winding of one coil was reversed, thus bringing the inside ends of both coils to one binding post, and the outside ends to the other. This has proved effective. So far as known, no relays of this construction have been burned out during the past year.

Considerable attention has been given to the further use of low resistance series-wound pony relays, and the results have been more than satisfactory. Various resistances have been tried, ranging from 25 to 50 ohms, and while the committee will not speak positively, 35 ohms is believed to be the most satisfactory resistance for ordinary existing conditions.

In making use of the multiple scheme, we are securing greatly improved service from the apparatus already on hand, and at a very slight expense. As to the proper amount of current, for the low resistance circuits, the committee believes 35 milliamperes to be the proper minimum. Better results will undoubtedly be secured with a current of 40, or forty-five milliamperes. This will slightly increase the cost of battery maintenance, but the results are such as would certainly warrant a considerable increase in expenditure.

Inquiries have been sent to each member of the association, and the universal reply is that circuits equipped with low resistance relays will work satisfactorily through weather that would make the wires practically inoperative if equipped with the ordinary instruments.

HIGHWAY CROSSING BELLS.

By G. C. Kinsman.

Since the association was asked to discuss this question at its last meeting, a bill has been introduced in one State Legislature to require every railroad to maintain a suitable alarm at each grade crossing. The promoters of this bill assume, and perhaps honestly believe, that it would benefit the public by wholly preventing, or at least greatly reducing the number of crossing accidents. Highway crossing alarms are useful and necessary under certain conditions, but would their general use bring

greater safety to the public? The custom of many generations has made it almost as natural before crossing a railroad track, to stop, look and listen, as to breathe; and this wise custom should continue until some form of absolute protection is introduced. Whether such protection is afforded by any signal now on the market is a question. Crossing alarms must accomplish what they set out to do else the danger is not lessened, but increased, for they are educating the people to depend upon them.

Can a signal be produced which will be subject to failure from ordinary wear and tear only?

To comply with the proposed law just mentioned would cost the Wabash road two hundred thousand dollars for installation and twenty thousand dollars yearly for maintenance in that one State. On most railroads the amount necessary for crossing alarm service would have to be taken from other needed improvements, or from the pay of employees.

Our first alarm was placed about nine years ago just within the corporate limits of a small city and at the behest of the city council. This bell rung with more or less regularity (generally less) for about seven years, since which time it has remained silent. We kept no record of failures, as we are required to practice economy in the use of stationery. There were no accidents of record previous to the placing of this alarm, none during its life, nor any since its decease.

At another point, an obscure crossing, an alarm was installed and found to work perfectly. Before the men got away, a wagon containing a man and his family approached. Just as the team was on the track, a train rang the bell. The farmer shouted "Whoa!" and began to look around. He was gotten off just before the train rushed by. Since then a claim has been made for damages said to have been sustained by a man whose team was scared by the ringing of this same bell.

I am told by those who have these alarms for sale that they should never fail if given proper attention. This one has been inspected weekly since its installation, by a competent lineman, who is required to make written report of its condition. It is also watched by the section foreman. It was most carefully installed, yet it has failed from high water and from high wind. Fine sand has also sifted into the box and paralyzed it. It has failed from loose and broken connections caused by the jar of frequent fast trains. Bad boys have made the post and gong a target for rifle practice. It has failed from extreme cold and from mice getting into the box. It even objected to the nailing up of a sign, stating that a man's wife had left his bed and board.

As between the best automatic alarms and the average crossing watchman, let us choose the bell for all points where it can be practically used, for while it may fail frequently from causes beyond human control, the watchman will fail more frequently from causes beyond the control of his employers.

THE PROTECTION OF TELEGRAPH WIRES AGAINST HIGH VOLTAGE.

By Prof. C. E. Freeman.

Any voltage producing a current considerably in excess of that for which the various parts are designed, may properly be termed a high voltage. To prevent a wire from breaking at the point where it crosses a dangerous wire, give it more slack. If a larger wire be substituted, the liability to break is much lessened even though the sleet-gathering surface is increased, since the strength of the wire varies with the square of the diameter, while the surface varies only with the diameter. To prevent a cross where a break occurs, the best scheme is to string protecting wires above and parallel with the dangerous ones; or, perhaps, put on an extra cross arm on the poles on either side and string a couple of heavy wires parallel and underneath the telegraph wires, connecting them with cross wires at appropriate intervals. Another way is to put up insulated telegraph wires where these cross other dangerous wires. At present, however, we have no weather-proof insulation. So-called weather-proof insulation lasts about three years. Hence, in order to make this scheme effective, provision should be made to renew these wires.

Lightning discharges may in some cases be prevented. When an insulated body becomes charged in any manner whatsoever, it induces an equal but opposite kind of charge on the body or bodies adjacent. These two charges tend to neutralize each other. It can be experimentally shown that bodies possessing points tend to discharge themselves. Other conditions remaining the same, it is more difficult to retain a charge on a body presenting a rough surface than one having a smooth outline. For a practical application of this principle string a barbed wire above the other wires on a pole line, and ground this wire every fourth or fifth pole. This has been employed out West on long distance lines with entire success. This same result has been obtained unconsciously in another way. When many wires are strung on a single pole line, they take the place of the barbed wire to a great extent. In fact the writer has been informed that such lines are struck very infrequently in comparison with those having fewer



Sketch Map of Brooklyn, Showing Lines of the Brooklyn Rapid Transit Company and the Long Island Railroad.

wires. A pole line having a single wire is notoriously troublesome in this respect.

When, in spite of precautions, excessive currents do get on to telegraph wires, we need a mechanical or thermal cut-out. The mechanical cut-out is a solenoid arranged to draw in a soft iron plunger which releases an arm against which a spring presses. The subsequent motion of the arm opens the circuit. The thermal cut-out is a fuse; a piece inserted in the conductor made of fusible alloy. The mechanical cut-out may be made to work much quicker than a fuse, and its capacity can be made more definite and fixed, but it costs more. The capacity of a fuse depends upon various things, including conditions of support, and the age of the fuse. One fuse tested by the writer was supported on a strip of red fibre and rated at one ampere. The current through it was gradually increased to 6.5 amperes, when after a lapse of 25 seconds it blew, in the meantime having set fire to the fibre. It is to be remembered that there is a continued increase in the thickness of the film of oxide on the outside of a fuse. This acts as a supporting shell to such an extent that the interior of the fuse may become entirely liquid—even red-hot—without breaking. Hence fuses should never be supported so as to remain in the circuit after being broken. They should drop out and thus prevent the molten material from feeding the arc that sometimes occurs. The coils of an ordinary relay can carry from 4 to 5 amperes indefinitely without scorching. About .05 amperes is the maximum current required to operate them. A ½-ampere fuse is amply sufficient.

A disruptive discharge is nothing more or less than an exceedingly rapid succession of currents, first in one direction and then in the other. The direction of these currents changes several millions of times a second in some cases. A wire constituting a part of the path therefore carries an alternating current of a very high frequency. If at some places along its length this wire is wound into a helix or spiral, it is found that this current experiences an unusual opposition to its flow, a counter-force called the electromotive force of self-induction. This counter-force is so great that in most cases the discharge finds its easiest path through the air and around the coil. In order to prevent the discharge from passing through the apparatus we wish to protect, we introduce a "choke coil" in series with the line, and then offer cut rates on our competing ground-wire line by bringing its terminal close to the "choke coils," separating them by means of some non-fusible insulating material. The idea of bringing the terminal of the ground wire close to the line wire and pointing the opposing parts to facilitate the discharge is an old one. The use of a choke coil as a further aid seems to have been overlooked in a great many instances.

One of the essentials of a lightning arrester is that it shall arrest and continue to do so with a minimum amount of attention. Wind a helix out of iron or spring brass wire anywhere from one inch to two inches in diameter and four inches to a foot in length. On the inside of this helix and covering its lower half, place a thin sheet of asbestos paper. Attach the helix in a suitable manner to a base so that it can be conveniently cut into the line. Inside the helix and upon the asbestos paper place an ordinary arc light carbon which has been connected by means of a flexible wire to a good ground. The carbon will not melt when the discharge occurs. If the metal should, it will flow away from the carbon instead of towards it and thus prevent the vexatious grounding so frequent with this class of apparatus. The cost would be nominal and the maintenance next to nothing. One of these arresters should be placed on either side of the station. To further protect the apparatus from the crosses already referred to, place half or quarter ampere fuses between the choke coils and the instruments. This will prevent them from being blown when a discharge occurs.

Efficient and reliable protection from lightning has been secured on power circuits in portions of the country where lightning is most severe. Arresters costing several hundreds of dollars are installed, but the expense is justified when the cost of the machinery amounts to several thousands of dollars. There is no doubt that telegraph lines can be equally well protected at a cost that would not exceed the yearly loss sustained by some companies from these troubles.

ELECTRIC LIGHTING FOR RAILROAD STATIONS.

This is the subject of a paper which was read by Mr. C. F. Annett (Illinois Central). Electricity is superior to gas because it can be so much more effectively distributed. In large waiting rooms and incandescent lights can often be used together with marked advantage. In the large Illinois Central station at Chicago it was found in the winter that between 4 p. m. and 6 p. m. the dynamos were overloaded; to obviate this difficulty 600 incandescent lights in the high ceiling were cut out and eight enclosed arc lamps were substituted, thus greatly increasing the illumination while saving about 40 electrical horse power. Electric lights are the only suitable illumination for high clock towers and for ticket offices of small area where a gas flame vitiates the air and frequently is disturbed by draughts when

the ticket window is open. With suitable wiring, electricity is safer than gas. It is also more economical, as, assuming that the cost per hour is the same for a gas jet as for an incandescent lamp, many lamp-hours can be saved because the electric lights can be so much more easily turned off when not needed. With arc lamps the cost per candle power is very much less than for gas or incandescents. Mr. Annett estimates that gas at \$1 a thousand is equal to incandescent lights at half a cent an hour.

In train sheds supported by numerous pillars incandescent lights are preferable to arc lights, but in a large shed consisting of a single span arc lights suspended by cables give the best results. In yards arc lights should be placed on poles at least 30 ft. high. By staggering the poles a yard may be well lighted not only on the tops of the cars but in the spaces between. Thin opal globes should be used. They diffuse the light so that, although a clear globe would give more light, it would be less satisfactory to the workmen. If a large station has to be supplied with hot water, and, therefore, has to have some steam power the year round, an electric lighting plant can be added with great economy. If there are 200 or more lights, the cost of the lighting in the six cold months of the year should be but little more than the interest on the investment. In the handsome new stations now becoming common, electricity has a great advantage in the absence of damage to decorated ceilings by smoke. The Illinois Central uses electric lights in semaphore signals at a number of stations.

The New Schenectady Locomotives on the Vandalia.

In our issue of April 23, page 297, appeared an engraving and description of an 8-wheel passenger engine built by the Schenectady Locomotive Works for the Vandalia Line, being one of four recently built. These engines have 20-in. x 26-in. cylinders and 78-in. driving wheels. They carry 190 lbs. working pressures, have a total heating surface of 2,241 sq. ft. and grate area of 30.07 sq. ft. They carry 85,800 lbs. on the drivers and are provided with tanks of 6,000 gallons capacity. We have recently received from Mr. W. C. Arp, Superintendent of Motive Power, some notes concerning the performance of these new engines, also of four engines which the Schenectady Works built for the Vandalia in September and October, 1895, and which have made unusual mileage.

"We were unusually fortunate in breaking in these locomotives without developing any defective parts or causing delays to our trains. They have thus far proved to be free steamers with our heaviest passenger trains, and the tanks of 6,000 gallons capacity enables us to run these engines 117 miles with one tank of water, the train consisting of seven cars, as follows, viz: Two postal cars, one combination coach and baggage car, one coach, two sleepers and one dining car.

"Below we have arranged a statement showing mileage made by the four 8-wheel passenger engines purchased in September and October, 1895, for the years 1896, 1897 and 1898.

Mileage Made by Schenectady Engines.				
	1896.	1897.	1898.	Total.
Engine 138.....	59,945	95,215	66,155	221,315
" 144.....	98,317	63,864	109,938	272,122
" 158.....	92,247	100,562	75,817	268,626
" 164.....	91,223	89,308	107,797	288,328
Total.....				1,050,391

"During this period of time the best mileage made in any stated month was as follows:

Engine 158.....	March, 1897, 13,792 miles.
	June, 1897, 13,493 "
	March, 1898, 14,610 "

"The engine was handled by three regular crews, the regular run being to double the road between Indianapolis and East St. Louis, 476 miles daily, the west bound train consisting of five postal cars, one express car and one coach, making twelve regular stops. The east bound train consisted of two postal cars, one combination coach and baggage car, one coach, two sleepers and dining car from East St. Louis to Indianapolis, one additional coach being added at Terre Haute.

"Engine 164, also built by the Schenectady Works, and delivered to the Vandalia Line in October, 1895, ran from March 27th to August 15th, 1898, 141 consecutive days, with a credit of 46,273 miles, being handled by two regular crews and hauling the heaviest passenger trains operated on the Vandalia Line.

"Engines 30, 144, 158 and 164 have cylinders 20 in. in diameter, 24-in. stroke, 66-in. wheel centers, which, with full tire, means a driving wheel 6 ft. 1 in. in diameter; weight in working condition, 136,700 lbs."

Locomotives and Machine Tools for Sweden.

We have already mentioned the fact of an order for locomotives for Sweden having been placed with the Richmond Locomotive & Machine Works. Mr. Victor Klemming, Mechanical Director in Chief of Swedish Railroads, has been in the country for some time inspecting these engines during their building and making other purchases. He has lately made a journey West looking after an order for tools which was placed with the Niles Tool Works. He has also visited St. Louis and intends to visit Chicago, if he has not already done so, and he has recently been the guest of Mr. Edward Grafstrom, of the Pennsylvania

Lines, at Columbus. He has also visited the Pennsylvania shops at Altoona, the Baldwin Works, the Schoen Works, the French Spring Company's works, the Latrobe Steel Works and the works of the Brown Hoisting and Conveying Co., as well as a number of other large manufacturing establishments.

This is the first time the Swedish Government has gone outside of Sweden to buy engines. Mr. Klemming much prefers to build his own engines, but although the railroad shops are working overtime there they are unable to meet the increased demand, which indicates the activity of the railroads. Mr. Klemming has chartered a steamer and expects to ship his engines, with a number of extra parts for repairs and certain machine tools, about June 20.

These engines are of the Richmond compound type and weigh about 122,000 lbs., with 62-in. drivers. They will be used for freight until winter sets in, when some of them will be put in passenger service. The immediate need is for fast freight engines on account of the heavy orders for Swedish ore for the English market. One of the new engines lately made a trial run at 58 miles an hour.

American Locomotives and the International Congress.

Mr. C. H. Quereau, Division Master Mechanic of the Denver & Rio Grande RR., Denver, Colo., has been chosen to report on Question XI. of the International Railroad Congress at the sixth session, to be held in Paris in the year 1900. This question refers especially to exhaust and draft of locomotives. Mr. Quereau writes to us that he sent out circulars to the number of 125 asking answers by May 15. Up to May 18 he had received only 20 replies. It seems to him, as it seems to us, important that American practice should be well represented at this Congress, and he asks us to call attention to his circular and to suggest the advisability of prompt answers to it. This we take pleasure in doing and print his circular below in full.

Exhaust and Draft of Locomotives.

"Means adopted to increase the production of steam by increased draft; for preventing fires caused by sparks from the stack; and for utilizing the heat of the exhaust steam."

Reporter Mr. C. H. Quereau, Division Master Mechanic, Denver & Rio Grande Railroad Co., Denver, Colorado, U. S. A., to whom replies should be mailed by May 15, 1899. It is very desirable that blue prints accompany the replies. In answering questions relating to your present practice, please refer to your latest standards and not to experimental designs, unless these have been tried long enough to warrant drawing final conclusions. The Reporter will be greatly obliged for any information or remarks on points not covered by the following questions, or fuller answers than the questions appear to ask for.

Fuel.

1. What kind of fuel is used? In case it is coal, please give analysis and evaporative tests, if possible.

Exhaust Pipe.

2. What is your present standard exhaust pipe? Please send blue print.

3. What was your standard exhaust pipe in 1890? Please send blue print and state reasons for your present practice if it differs from that of 1890.

4. If you have used the form of exhaust pipe recommended by the American Railway Master Mechanics' Association, with what results?

5. What is the diameter of the opening of the exhaust tip used with the following cylinders? a. 17x24 inches; b. 18x24 inches; c. 19x24 inches; d. 20x24 inches; e. 20x26 inches. These dimensions should be given from roundhouse rather than drawing room records.

6. What form of exhaust tip do you use as standard? Please give blue print.

7. What form of exhaust tip did you use in 1890? Please give blue print and reasons for change in standard.

8. Do you approve of the use of a bridge in the exhaust tip to increase the draft?

Stack.

9. What is your present form of stack? Please give blue print and size of cylinders it is used with.

10. The same as question 9, except for 1890. Please send blue print and give your reasons for the change.

11. What dimensions do you vary for different sizes of cylinders, and what rule or rules are followed? This is not intended to include variations in height made necessary by clearances.

12. Do you have any fixed difference between the exhaust tip and the choke, or base of the stack? If so, what is the distance? And if not, do you endeavor to have any fixed relation between these points?

13. Does your present practice differ from that of 1890? If so, how?

Baffle Plates.

14. What is your present standard arrangement of diaphragm or baffle plates? Please send blue print.

15. The same as question 14, except for 1890. Please give blue print and your reasons for the change.

Petticoat Pipe.

16. Do you use a petticoat pipe or pipes, with straight or taper stacks? If so, how are they adjusted with relation to the exhaust pipe and stack? Please send blue print.

17. To what extent are you annoyed by failures because of lack of steam due to petticoat pipes working out of proper adjustment?

18. In case a diamond stack is standard, what is your standard petticoat pipe and how adjusted as to the exhaust pipe and stack? Please send a blue print.

Extended Front End.

19. In case an extended front is your standard, please give its length from the front flue sheet to the inside of the door ring, and from the front of the cylinder saddle to the inside of the door ring.

20. How do these dimensions compare with those used in 1890 for the same size engines?

Netting.

21. What is your standard arrangement of front end netting? Please send blue print.

22. In case wire is used, please give your standard number

of meshes per inch, and size of wire. If perforated plates, what are the dimensions of the openings and their proportion of the total area of the plate?

23. What are your reasons for preferring the wire, or the perforated-plate netting?

24. Do you inspect nettings at stated intervals? If so, do you make a permanent record of such inspections, giving the conditions in which the netting is found and repairs made? If so, are these records of value in case of law suits?

25. In case of suits because of damage by fires set by locomotives, to what extent do the courts hold responsible? If the evidence shows that you have the latest improved designs for arresting sparks, and these were in good order, does this relieve you from responsibility?

26. Please send a blue print showing the general arrangement of your standard front end.

27. If you use fire guards in or outside the right of way, what is your practice and success?

28. On what do you depend most for the prevention of fires caused by sparks from the stack? The front end arrangements on your engines, or fire guards outside?

Variable Exhaust Tips.

29. What is your opinion of the advantages and disadvantages of variable exhaust tips? And are these opinions based on experience?

Exhaust Steam.

30. Have you adopted any arrangement by which part of the heat of the exhaust steam is utilized? Or are you planning to experiment with any such arrangement?

Fast Passenger Locomotives of the Chicago and Northwestern Railway.

In the description of the new Atlantic type passenger locomotives of the Chicago, Burlington & Quincy, published May 5, reference was made to some new eight-wheel locomotives recently built by the Schenectady Locomotive Works for the Chicago & Northwestern, to be used in fast service between Chicago and Omaha. We are now able to illustrate these latter engines, and give their principal dimensions.

on the wheels is but little more than that of other engines of this type with much smaller boilers, an idea is obtained of the care taken with the design. Specifications were furnished by the road, and the details were worked out by the builders under the personal direction of Mr. W. H. Marshall, Assistant Superintendent of Motive Power, in consultation with the Engineering Department of the Schenectady Locomotive Works. Each detail was considered with a view to reducing its weight without a sacrifice of strength, and so cast and pressed steel have been largely used. Attention is also called to the unusually large journals of the driving and truck axles, being respectively 9 in. in diameter by 11½ in. long, and 6 in. by 12 in.

For ready comparison the accompanying table of the principal dimensions of these and other important eight-wheel locomotives are given, to which is added the new Atlantic type locomotives of the Chicago, Burlington & Quincy.

The additional dimensions of the Chicago & Northwestern locomotives are as follows:

Type	Eight-wheel
Service	Mail-passenger
Number built	6 mail, 6 passenger
Gage	4 ft. 8½ ins.
Kind of fuel to be used	Bituminous coal
Weight, tender empty	46,800 lbs.
Wheel base, total, of engine	24 ft. 8 ins.
" " " " " " " "	8 ft. 6 ins.
" " " " " " " "	51 ft. 11½ ins.
Height of stack above rails	15 ft. 2 ins.—15 ft. 1½ ins.
Drivers, material of centers	Cast steel
Truck wheels, diameter	36 ins.
Journals, driving axle, size	9 x 11½ ins.
" " " " " " " "	6 x 12 ins.
Main crank pin, size	6 x 6 ins.
Piston, rod, diameter	3½ ins.
Kind of piston rod packing	Metallic
Steam ports, length	18 ins.
" " " " " " " "	1½ ins.
Exhaust ports, length	18 ins.
" " " " " " " "	3 ins.
Bridge, width	13½ ins.

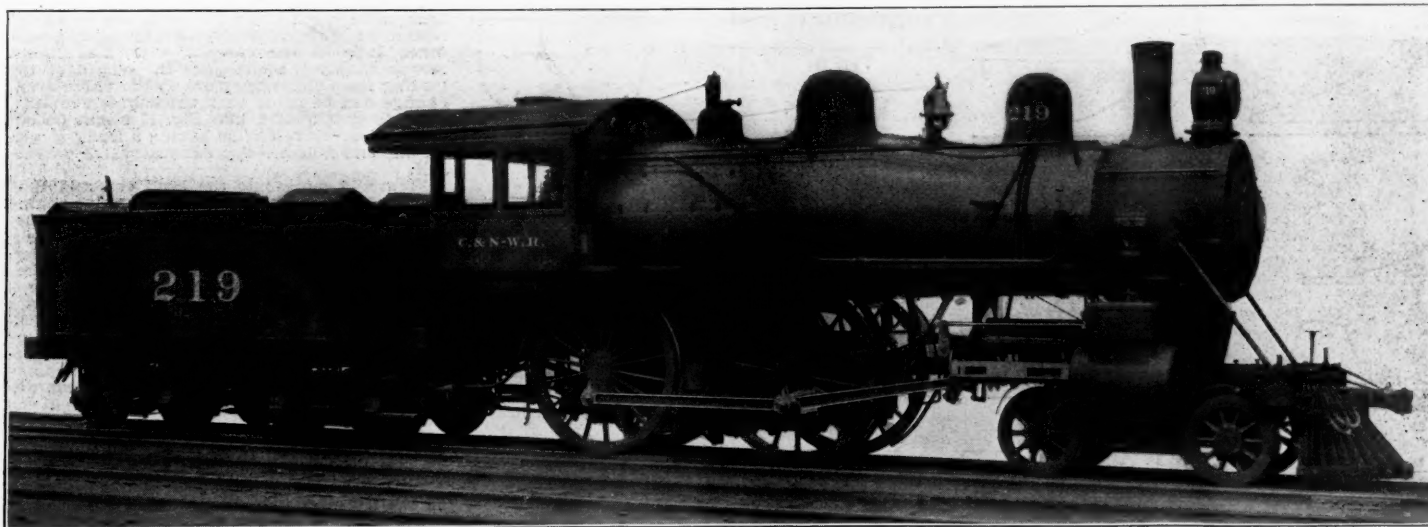
Type of under-frame, wood or iron.....10-in. channels
Type of truck.....Diamond frame
Diameter of truck wheels.....36 ins.
Diameter and length of axle journals.....5 x 9 ins.
Length of tender frame over bumpers.....16 ft. 10 ins.

Makers of Special Equipment.

Tires.....Krupp
Sight-feed lubricators.....No. 9 Nathan Mfg. Co.
Safety valve 2-3 in.....Ashton Valve Co.
Whistles.....Starr Brass Co.
Sanding devices.....H. L. Leach
Injector.....Monitor No. 10, Nathan Mfg. Co.
Driver brake equipment.....Westinghouse
Tender brake equipment.....Westinghouse
Tender brake beam....."Kewanee," American B. B. C.
Piston rod packings.....C. C. Jerome
Valve.....C. C. Jerome

Electric Headlights and Signal Lights.

The officers of the Chicago, Rock Island & Pacific have been making experiments in the visibility of signal lights on the front end of locomotives as affected by a powerful electric headlight. This road now has 23 locomotives equipped with electric headlights and the question arose whether the great brilliancy of these lights would not interfere with the efficiency of the white and green lights carried on the front ends of engines to indicate the class of a train or that a second section of the train was to follow. The experiments, as described in the Railway Age, were made near Chicago on the evenings of April 28 and May 9. A party of observers stationed themselves at the side of the track and the engine carrying the lights, having been backed away about two miles, was run toward the observers at the highest speed attainable. The lights were tried in their usual positions and again fixed to brackets extending out sidewise about 20 inches from the smokebox. Then the lights were moved from their position (20 in. back) to a point even with the smokebox front; and again they were placed on the pilot beam. The engine was run at high speed in every



Locomotive for the Chicago & Northwestern Mail Trains.

ROBERT QUAYLE, Superintendent of Motive Power.

Builders, SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

There are two classes, both of the eight-wheel type, one being for the mail trains, and the other for heavy passenger trains. The accompanying engraving shows one of the six locomotives for hauling the fast west-bound mail trains, which has cylinders 19x26 in., 80 in. driving wheels, 85,700 lbs on the driving wheels, and a total weight of 133,800 lbs. The boiler is of the extended wagon top type, 62 in. in outside diameter at the first ring, having 2,164 sq. ft. of tube heating surface, with tubes but 13 ft. long, 15 sq. ft. of heating surface in the water tubes, and 174 sq. ft. in the fire box, making in all a heating surface of 2,353 sq. ft. The working steam pressure is 190 lbs., and the grate has an area of 30.33 sq. ft. The west-bound mail trains usually consist of four cars weighing empty about 40 tons each; at times, however, there are six cars in the train, and the loading varies from 16 to 30 tons per car. East-bound these locomotives will haul fast passenger trains. So far there has been no opportunity to make a thorough test of the running qualities, but at speeds between 70 and 80 miles an hour, they are known to be remarkably easy riding engines.

The locomotives for hauling the heavy passenger trains are also six in number, and have 75 in. driving wheels and 19½x26 in. cylinders, the smaller wheels making possible still larger boilers of the same type. The weight on the driving wheels is 87,000 lbs., and the total weight 137,000 lbs. The outside diameter of the boiler at the front is 64 in., the tubes are 13 ft. long, and the heating surface is as follows: Tubes, 2,313 sq. ft.; water tubes, 16 sq. ft.; fire box, 179 sq. ft., or a total of 2,508 sq. ft. of heating surface. The grate area is 30.33 sq. ft., and the working pressure 190 lbs. This is considerably the largest boiler ever used with an eight-wheel locomotive, and has practically the same heating surface as the new Atlantic type locomotive of the Burlington.

When account is taken of the fact that the weight

Valves, kind of	Allen and American
" " " " " " " "	6 ins.
" " " " " " " "	1¼ ins.
" " " " " " " "	¾ in.
" " " " " " " "	¾ in.—¾ in.
Boiler, material in barrel	Carbon steel
" " " " " " " "	thickness of material in barrel
Seams, kind of horizontal	Butt joint, sextuple riveted
" " " " " " " "	circumferential. Lap joint, double riveted

Table of Some Important Passenger Locomotives.

Published in Railroad Gazette.	This Issue.	This Issue.	May 5, 1899.	April 23, 1899.	Dec. 27, 1895.	April 28, 1893.
Name of road	C. & N. W.	C. & N. W.	C. B. & Q.	Vandalia	P. R. R.	N. Y. C. & H. R.
Type	8-wheel	8-wheel	Atlantic	8-wheel	8-wheel	8-wheel
Number or class	Mail	Passenger	1,591	Passenger	"L"	969
Cylinders, in. x in.	19 x 26	19½ x 26	13½ and 23 x 26	20 x 26	18½ x 26	19 x 24
Driving wheels, in.	80	75	84½	78	80	86
Weight on driving wheel, lbs.	85,700	87,000	85,850	85,800	91,600	84,600
" " " " " " " "	48,100	50,000	40,200	46,500	43,200	40,000
" " " " " " " "			33,000			
" " " " " " " "	133,800	137,000	159,050	132,300	134,800	124,000
Boiler pressure per sq. in.	190	190	190	190	185	190
Heating surface, firebox, sq. ft.	174	179	190	175	171	233
" " " " " " " "	2,164	2,313	2,320	2,066	1,747	1,697
" " " " " " " "	15	16				
" " " " " " " "	2,353	2,508	2,500	2,241	1,918	1,930
Grate area, sq. ft.	30	30	35	30	33	30.7

Crown sheet stayed with	1 in. radial stays
Firebox, length	9 ft. 3 in.
" " " " " " " "	3 ft. 4½ ins.
" " " " " " " "	78½ ins.—79½ ins.
" " " " " " " "	64½ ins.—66½ ins.
" " " " " " " "	Carbon steel
" " " " " " " "	thickness of sheets
" " " " " " " "	¾ in. and ½ in.
" " " " " " " "	brick arch? Yes—on water tubes.
" " " " " " " "	water space width
" " " " " " " "	Front, 4½ ins.; Sides, 4 ins.; Back, 4 ins.
Grate, kind of	Rocking, supported on studs
Tubes, number	320—342
" " " " " " " "	material
" " " " " " " "	Charcoal iron
" " " " " " " "	outside diameter
" " " " " " " "	length over sheets
Exhaust nozzle	Single
" " " " " " " "	Permanent
" " " " " " " "	diameter
" " " " " " " "	4½, 5 and 5½ ins.
Stack	Taper
" " " " " " " "	least diameter
" " " " " " " "	14 ins.
" " " " " " " "	greatest diameter
" " " " " " " "	16½ ins.
Tender	Swivel trucks
Type	Swivel trucks
Tank capacity for water	5,200 gals.
Coal capacity	8 tons

of value between the different colors, but it was demonstrated that the visibility of the signal lights could be much improved by putting them on the pilot beam, instead of on the upper part of the smokebox, thus getting them farther away from the headlight, and also by attaching to the headlight an extension hood in the shape of a tube extending horizontally in front. A tube of this kind 18 in. in diameter was tried, and another 16 in. in diameter. The hood was run out from 4 in. to 14 in. in different experiments. In all the tests the signal lights were easily distinguished at a distance of 650 ft., and when they were even with the front of the smokebox they were always discerned earlier than when in their usual position 20 in. back. With the 16-in. headlight hood, extended 4 in., green lamps, even with the front end, lit by 16-c. p. incandescent electric lights, were visible about 1,200 ft. away.

Some Uses of the Steam Engine Indicator.*

By Mr. Edward F. Miller.

[The author opens with a brief description of the indicator and follows with a few remarks on calculating the horse-power from the cards, after which he discusses as follows the use of the steam engine indicator in setting valves and in determining some defects, as brought out by the cards.]

Figure 1 shows a card taken from a Corliss engine, running at a speed of about 90 revolutions per minute. On account of the slow speed and the quick admission obtained by this form of valve gear, but little compression is needed. For high speed engines there is much more compression. At high speeds the expansion line of the indicator card, instead of being a smooth curve like that shown in Fig. 1, is often a wavy line due to oscillations of the spring in the indicator.

Figure 2 represents what is called a stroke card. The indicator shows the pressure on one side of the piston for a revolution. When we calculate the horse-power from a card, we are assuming that the back pressure and compression line on the other side of the piston are the same as shown on the card. This may, or may not, be the case. In calculating the total horse-power for the two ends of the cylinder, any error from this cause affecting the calculation for one end of the cylinder will be nearly balanced by an opposite error in the calculations for the other end, so that the final result is practically right. If it were not for the piston rod making the area of one side of the piston smaller than that on the other, there would be absolutely no error arising from this.

ports, or to both of these combined. This does not apply, of course, to engines using throttling governors.

Figure 3 shows the effect of too small steam pipe. When steam is admitted to the cylinder there is a drop in pressure in the chest. This drop becomes greater in amount as the speed of the piston increases. At cut-off the flow of steam into the cylinder stops, then the pressure in the chest reaches boiler pressure.

If there is no great drop in the line on the steam chest card, and a considerable drop in the steam line of the card, it would mean that the ports are too small. Such a case is shown by Fig. 4.

If there is a drop in the chest line up to cut-off, and a still greater drop in the steam line of the card, it would indicate that both the steam ports and the steam pipe were too small. Fig. 5 shows such a case.

Eccentric Out of Place.

Figures 6, 7, 8 and 9 show cards taken from a Corliss engine, having the eccentric out of adjustment.

Similar cards would be obtained from any engine having all the valves moved by one eccentric. The plain slide valve and the locomotive, especially in full gear, would give similar cards for the same derangements of eccentric.

Figure 6 was taken with the eccentric a trifle less than 90 degrees ahead of the crank, or about 20 degrees behind where it belongs on this particular engine.

Figure 7 shows the eccentric moved too far ahead of the crank. By comparison with Fig. 1, it will be seen that moving the eccentric back makes all the events of the stroke, such as admission, release and compression and cut-off, in the case of engines without automatic cut-off governor, come later; while

compression and release coming near the middle of the card, and being spread out over considerable length, the cut-off expansion and back pressure lines coming near the ends of the card.

Figure 10 gives a steam card drawn, assuming that the expansion and compression lines are hyperbolas. The eccentric card for this has been plotted, and corresponding points marked with the same letters. The compression curve, extending from F to A, is a double curve. Admission occurs at A. Cut-off at B. Release at C and compression at F.

Figures 11 and 12 show cards taken from an engine having tight valves and a tight piston. Corresponding points on the two cards are lettered the same.

For a cut-off later than half stroke, the steam line on the eccentric card doubles on itself, as shown by Figs. 13 and 14.

The peculiar bend shown by the dotted line on compression curve of the steam card, Fig. 10, is developed on the eccentric card into a well marked flat place. Evidently this represents a loss of pressure, at this point, which may be attributed to one or more of three causes: first, leakage by the piston; second, leakage by the exhaust valves; third, a rapid condensation of steam. If a leakage, it is probable that there is steam blowing by all through the stroke. Near the end of the stroke the piston is moving at so slow a rate that the leakage overbalances the compression. It frequently happens that the pressure drops off at the end of compression, making the upper end of the compression line resemble an inverted letter U. If the leakage is by the piston, it will appear or may be made to appear near release, as will be explained later. The effect of compressing steam is to dry it, or if dry already, to superheat it. While it may be possible in some cases for some of the drop here to be due to condensation, in the majority of cases leakage is the trouble.

Figure 15 shows the effect of a bad leakage by the piston. This leakage is made evident by the appearance of the upper end of the compression curve, and by the increase in pressure on the expansion line just before release. By referring to the stroke card it will be seen that near this point the pressures on the opposite side of the piston are the greater, so that the leakage is now into the side on which the card is being taken. Unless compression on one side comes earlier than release on the other side, this method would fail. In most engines the valves are set so that compression does come earlier, and all four valve engines can be easily set so as to delay release on one end, and to hasten compression on the other end. In the case of a Corliss engine, this means simply the changing the length of the rods leading from the wrist plate to the valve arm. This change can be made with the engine running. It is possible that a card like Fig. 15 might be obtained from a four valve engine having a leaky steam valve on one end and a leaky exhaust valve on the other end.

Figure 16 represents the head end and the crank end cards taken from a plain slide valve engine. The valve has equal steam laps and equal exhaust laps. The only trouble in this case is that the valve spindle is too short. Shortening the valve spindle decreases the outside lap of the valve and increases the inside lap for the head end side, and increases the outside lap and decreases the inside lap for the crank end. As will be seen by the cards, the head end has the cut-off lengthened, the release delayed, and the compression hastened; the crank end has the cut-off shortened, the release hastened, and the compression delayed. If the valve spindle was too long, the cards shown would be interchanged, the crank end card being like one marked head end.

Figures 17, 18, 19 and 20 represent cards from one end of the steam and one end of the water cylinders, of a Deane independent air pump, used in connection with a surface condenser, to maintain a vacuum in the low pressure cylinder of an engine.

Figure 17 is the steam card. Fig. 18 is the water card reduced to the same scale of spring and placed in its proper position with reference to the atmospheric line of the steam card. During the first part of the stroke, as there is but little resistance offered in the water cylinder, which is partially filled with a mixture of air and water, the steam piston moves very rapidly; near the end of the stroke the water piston brings up on the water and through the increased resistance offered slows down the steam piston. On account of the rapid motion of the steam piston during the first part of its stroke, the steam line shows wire-drawing. Near the end of the stroke, where the piston speed is reduced, steam has time to flow into the cylinder, and to raise the steam line up to within a few pounds of boiler pressure. On the return stroke, during the rapid motion of the piston, the exhaust line is kept up; then as the motion of the piston is checked the back pressure line drops as shown. The pump cylinder has large clearances. The bottom line from left to right represents the filling stroke, the top line the compression to a few pounds above the atmosphere, and then delivery along the upper line at the left.

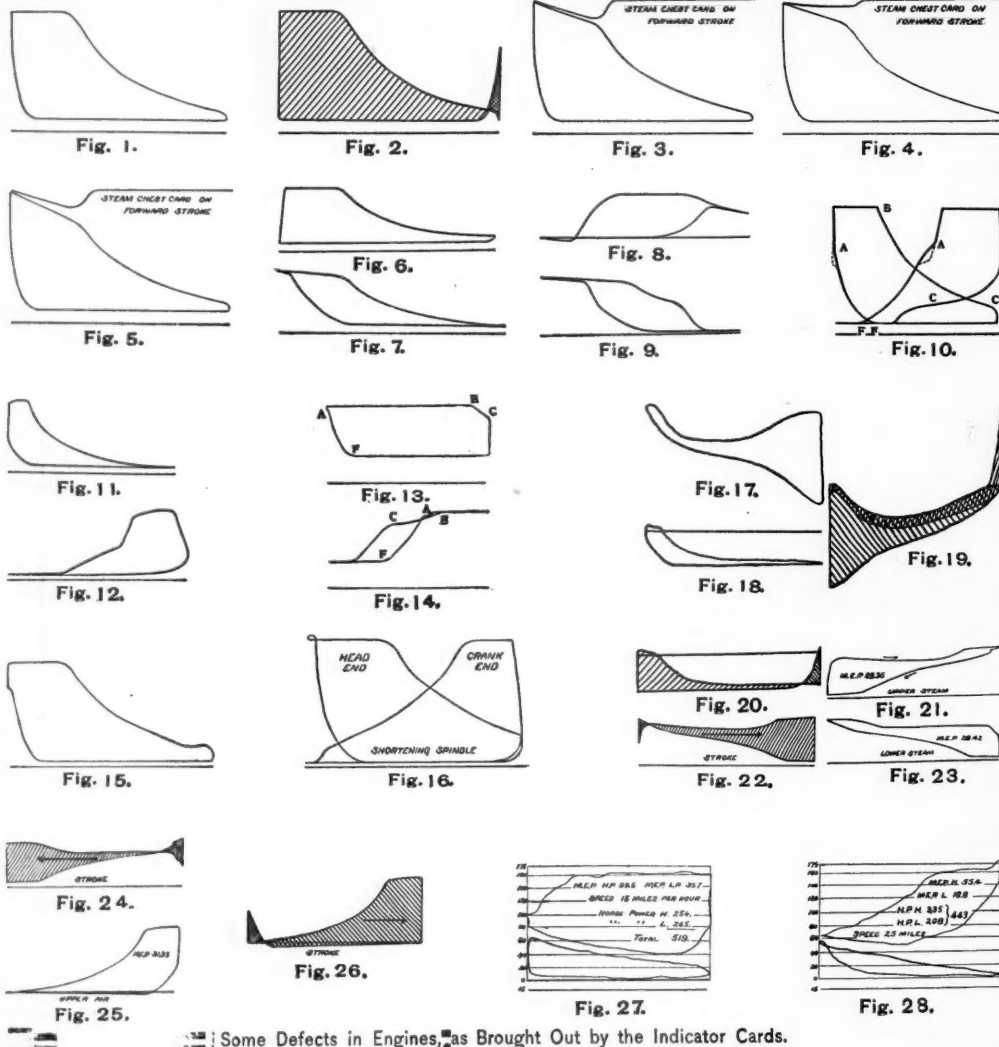
The stroke card for the steam cylinder is given in Fig. 19. From this it appears that the difference of pressure on the two sides of the piston is small, till near the end of the stroke. A comparison with the steam card shows how misleading the steam card may be to one who does not know how to interpret it.

The stroke card of the water end is shown by Fig. 20. As both pistons are on the same rod, the difference in total pressure on the steam and water pistons at any time must show the force per square inch required to overcome the friction of the pump and to move the working parts. In this particular case the area of the water piston is two and a half times the area of the steam piston.

In the ordinates of the water stroke card, Fig. 20 multiplied two and a half times are measured up from the bottom line of the steam stroke card, Fig. 19, the difference between the line thus constructed and the upper line will be the force per square inch at any point. At the point where the lines cross in the water stroke card, there is no resistance offered by the water piston. To the right of this point the expansion of the air compressed in the clearance space of the water cylinder tends to help the steam move the piston, so these ordinates are added to the upper line as shown.

Figures 21 to 27 show cards from both the steam and air ends of a Westinghouse air brake pump. It will be noticed that the cards are very similar to those just described. Cards taken from the steam cylinders of a locomotive are usually more irregular than those obtained from a stationary engine. This is due simply to the vibration of the pencil arm and spring of the indicator, which results from jarring.

Figures 27 and 28 are cards from Vaucain four



Some Defects in Engines, as Brought Out by the Indicator Cards.

The stroke card shows the pressure on opposite sides of the piston at all points of the stroke. The difference between the lines at any point is the effective push per square inch. This card is constructed by using the steam and expansion lines of the card from one end, and the back pressure and compression lines for the same stroke from the card taken on the other end.

In constructing this diagram for very accurate work, the ratio of the areas of the two sides of the piston have to be considered. The pressure above the atmosphere for one side being multiplied by this ratio. It will be seen that up to the point of cut-off, the difference of pressure or effective pressure is nearly constant; this difference grows less, due to the drop along the expansion curve, till at the point where the two lines cross the pressure on the two sides balance. Beyond this point the pressure exerted to hold the piston back is greater than that exerted to push it ahead. The energy stored in the fly-wheel during the first part of the stroke is given out here near the end of the stroke to help the engine over the dead point.

One of the uses of a diagram of this sort will be explained in the case of the air pump cards and air brake cards, shown in Figs. 17 to 27.

Steam Chest Cards.

By attaching one indicator to the steam chest of an engine and another to one end of the cylinder, it can be seen whether the pipes and ports are of sufficient size.

A sloping steam line on an indicator card may be due to too small a steam pipe or to too small steam

moving the eccentric ahead brings these events earlier.

Figures 8 and 9 are similar to Figs. 6 and 7, the only difference being that the eccentric is moved a greater distance out of place.

In Fig. 8 the admission is very late. Release does not occur till after the piston has started on the return stroke, the steam till released being compressed back along the expansion curve.

This compression is always a trifle below the expansion line, due to the fact that some of the steam has condensed in the interval between the end of the stroke and release.

Figure 9 shows too much compression and too early a release. Steam is compressed above boiler pressure in the cylinder, when the valve lifts, and the steam escapes into the chest.

Cards like Figs. 6 and 7 are very common.

I have found three large engines running factories, with the valve gear as badly out as cards 8 and 9 would indicate. No doubt many here can recall cases where cards fully as bad, if not worse, have been taken.

Irregular Cards.

As small distances near the ends of the indicator cards represent a large angular motion of the crank, the events occurring at the ends of the card are so squeezed together that it is hard to tell from the card just what any peculiarity in the lines may be due to. The eccentric rod working the valves of the engine will be moving at its greatest speed, when the crank is near the centres, and the piston near the ends of the stroke; since the eccentric is about 90 degrees ahead of the crank. If the motion for the indicator drum is taken from the eccentric rod instead of from the crosshead, the card will be changed in shape,

*Paper read before the New England Railroad Club, April 11, 1899.

cylinder compound. The area of the high pressure piston is 129.2 sq. in.; the area of the low pressure piston is 376.6 sq. in. The stroke is 24 in. Driving wheels are 194.5 in. circumference. The long cut-off was taken with the reverse lever in the fourth notch. The shorter cut-off with the reverse lever in the tenth notch. There are many other uses to which the indicator may be put besides those mentioned here.

The cases considered are such as will serve to detect some of the common defects of steam engines, and so lead to a saving in the use of steam.

New Railroad Building in 1898.

The revised figures given below show the total mileage of new roads built in the last year (exclusive of second track and sidings) to be 3,265 miles. This is an increase of some 400 miles over the preliminary estimates made late last December. Even this larger figure is doubtless too small to represent the entire increase of mileage made in the United States last year. The figures for the year before were 2,109 miles, which was but little more than the increase for the preceding three years. There is reason to believe from the activities now apparent that the new building of 1899 will much exceed even the higher figures of last year. The corrected figures leave Minnesota in the lead with 292 miles; then follow Texas with 208 miles; New Mexico, 173; Louisiana, 165; Alabama, 162; Arkansas, 155; Oklahoma Territory, 144; and Georgia and North Carolina, 140. Connecticut, Massachusetts, New Hampshire, Rhode Island, Kansas and the District of Columbia, so far as known, did not add a mile to their railroads last year, and Delaware, Vermont and New Jersey added less than three miles each. In Canada the new road built reached 507 miles, against 396 miles last year. In Mexico 495 miles was built, against 317 miles the preceding year. The totals by States are as follows:

NEW RAILROAD BUILDING IN 1898.

States.	Com- panies.	Mile- age.	States.	Com- panies.	Mile- age.
Alabama.....	7	162.48	New Jersey.....	2	2.24
Alaska.....	1	20	New Mexico.....	3	173.1
Arizona.....	4	99.3	New York.....	7	45.53
Arkansas.....	12	154.62	North Carolina.....	12	140.75
California.....	7	124.15	North Dakota.....	1	77.5
Colorado.....	6	36.23	Ohio.....	6	91.2
Delaware.....	1	1.5	Oklahoma Ter.....	4	144.5
Florida.....	6	53.13	Oregon.....	3	59.55
Georgia.....	11	140.22	Pennsylvania.....	29	126.71
Idaho.....	1	21	South Carolina.....	2	16
Illinois.....	4	8.95	South Dakota.....	1	11
Indiana.....	4	24	Tennessee.....	2	10
Indian Territory.....	5	62.99	Texas.....	15	207.58
Iowa.....	3	50.2	Utah.....	3	47
Kentucky.....	3	18.9	Vermont.....	1	2
Louisiana.....	9	165.18	Virginia.....	4	51
Maine.....	3	131.85	Washington.....	4	19.7
Maryland.....	2	15.3	West Virginia.....	6	39.5
Michigan.....	12	104.75	Wisconsin.....	7	62.2
Minnesota.....	9	292.4	Wyoming.....	1	6.3
Mississippi.....	4	42			
Missouri.....	9	147.7	United States.....	241	3,264.75
Montana.....	2	39.5			
Nebraska.....	2	4.04	Canada.....	14	507.28
Nevada.....	1	11	Mexico.....	14	495.4

Below are given particulars as to the new building in detail by states, roads and sections built:

UNITED STATES.

Alabama.	
Alabama & Florida.—Georgia line to end of track..	3
Alabama & Tombigbee.—Fulton to Eutaw.....	4
Mobile & Ohio.—End of track to Montgomery, 97.6 miles; Warrior Branch, 10 miles; Blockton Branch, 13 miles; branch to Mertz Station, 7 miles; total.....	127.6
Plant System.—Alabama Midland extension from end of track to Elba.....	21
Russellville Ore.—New Town to R. O. Co.'s Mines.	1.25
Seaboard of Alabama.—Chatham to Turners.....	2
Southern.—Leeds to Castleman.....	3.63
Total.....	162.48
Alaska.	
White Pass & Yukon.—Skagway to International boundary.....	20
Arizona.	
Arizona & Southeastern.—Deer Point to the Mexican boundary line.....	4
Gila Valley, Globe & Northern.—Geronimo to Globe.....	57.8
Santa Fe, Prescott & Phoenix.—Prescott & Eastern extension from Phoenix to Mayer.....	26.5
Saginaw Southern.—Williams South toward Jerome.....	11
Total.....	99.3
Arkansas.	
Arkansas & Choctaw.—Arden to Choctaw City, 12 miles; branch, 1 mile; total.....	13
Arkansas & Oklahoma.—Bentonville to Gravette.....	17.5
Arkansas Central.—Central City to a point four miles beyond Charleston.....	17
Arkansas Southern.—Farnell northwest toward Magnolia.....	3
Des Arc & Northern.—Higginson to Des Arc.....	20
Jonesboro, Lake City & Eastern.—Lake City to Leachville.....	16
Kansas City, Pittsburgh & Gulf.—Ft. Smith Branch, from Indian Territory line to Ft. Smith Little River Valley.—Morris Ferry west to Indian Territory line.....	1.12
Louisiana & Northwest.—Louisiana line to Magnolia.....	8
Mississippi River, Hamburg & Western.—Hamburg to Montrose.....	13
Ultima Thule, Arkadelphia & Mississippi.—Washington to Bear Head.....	20
White River, Lonoke & Western.—Wooley toward Seaton.....	6
Total.....	154.62
California.	
Atchison, Topeka & Santa Fe.—Perris & Lake View Extension from Lake View Junction to Lake View.....	8.05
Daggett & Borate.—Daggett to Borate.....	10
Los Angeles Terminal.—Hartwell up Millard Canyon.....	1
Pacific Coast.—Union to Betteravia.....	4
San Francisco & San Joaquin Valley.—End of track to Bakersfield, 55.5 miles; Visalia to Corcoran Junction, 24 miles; total.....	59.6
Sierra.—Jamestown to Sierra.....	4
Southern Pacific.—Montalva to Oxnard, 4.4 miles; Pomona Junction to Chino, 4.51 miles; Ventura Junction to Nordhoff, 15 miles; Visalia to Exeter, 10.12 miles; Surf toward Elwood, 2 miles; spur at Riverside, 1.47 miles; total.....	37.5
Total.....	124.15

Colorado.	
Colorado & Northwestern.—Sunset to Ward.....	13.5
Crystal River.—End of track to Redstone.....	5
Denver & Rio Grande.—Extension to mines.....	7
Florence & Cripple Creek.—Golden Circle extension from end of track beyond Goldfield to Victor.....	2.5
Leadville Mineral Belt.—Leadville to Mab Mine.....	2.25
Rio Grande & Pagosa Springs.—Chromo to Price.....	6
Total.....	36.25
Delaware.	
Queen Anne's.—Extension at Lewes.....	1.5
Florida.	
Atlantic, Valdosta & Western.—Georgia line to Ft. Moniac.....	14.63
Ellaville, Westlake & Jennings.—End of track to Belleville.....	7
Ft. White & Southern.—Santa Fe River to Cedar Creek.....	4
Gainesville & Gulf.—Ft. Irene to Fairfield.....	2.5
Tallahassee Southeastern.—Tallahassee to Wacissa River.....	21
Valdosta Southern.—Georgia State line to Sanderson.....	4
Total.....	53.13
Georgia.	
Atlantic, Valdosta & Western.—Suwanee River to Florida line, 10 miles; Haylow toward Valdosta, 4.9 miles; total.....	14.9
Bainbridge Northern.—Cyrene Junction to Eldorado.....	4
Central of Georgia.—Bruton & Pineora extension from Bruton through Stillmore.....	47
Georgia Northern.—Moultrie to Doerun.....	15
Georgia Pine.—Corea to Arlington.....	15
Hawkinsville & Florida Southern.—End of track 10 miles east of Davisville toward Fitzgerald.....	4
Seaboard Air Line.—Loganville to Lawrenceville.....	10.33
South Georgia.—Barnes to Tallahassee.....	7
Stillmore Air Line.—Stillmore to Dekle.....	5
Wadley & Mt. Vernon.—Rixville to Pendleton.....	12
Waycross Air Line.—Nicholls to Douglas.....	12
Total.....	140.22
Idaho.	
Northern Pacific.—Pullman to Lewiston.....	21
Illinois.	
Centralla & Chester.—Chester to Menard.....	1
Chicago Terminal Transfer.—Franklin Park to Des Plaines River.....	5
Galesburg & Great Eastern.—Ellettsville to Victoria.....	2
Illinois Central.—Chicago & Texas extension from McClure to Gray's Point, 4.93; Mt. Carbon to Murphysboro, 1.5 miles; total.....	5.43
Total.....	8.93
Indiana.	
Chicago & Wabash Valley.—Zudoc to Comer.....	10
Chicago, Indiana & Eastern.—Fairmount to Swayzee.....	11
Chicago, Indianapolis & Louisville.—Bedford toward stone quarries.....	1.5
Cleveland, Cincinnati, Chicago & St. Louis.—Belt line extension at Anderson.....	1.5
Total.....	24
Indian Territory.	
Arkansas & Choctaw.—End of track west.....	2
Kansas, Oklahoma & Gulf.—Wister to Howe.....	6.7
Kansas City, Pittsburgh & Gulf.—Ft. Smith Branch, from Ft. Smith Junction to Arkansas line.....	15.04
Little River Valley.—Arkansas State line west toward Atoka.....	2
St. Louis & San Francisco.—St. Louis & Oklahoma City extension from Sapulpa to Territory line.....	37.25
Total.....	62.99
Iowa.	
Burlington, Cedar Rapids & Northern.—Cedar Rapids, Garner & Northwestern extension from Hayfield.....	20
Muscatine North & South.—Muscatine to Erick.....	23.7
Omaha Bridge & Terminal.—At Council Bluffs.....	1.5
Total.....	50.2
Kentucky.	
Licking Valley.—Yale to Fugate.....	3.5
Nashville, Chattanooga & St. Louis.—Extension of main line at Hickman.....	4
Red River Valley.—Rothwell to Apperson.....	15
Total.....	18.9
Louisiana.	
Arkansas, Louisiana & Southern.—Meriden to Cotton Valley.....	20
Franklin & Abbeville.—Branch to Pechieo.....	4
Louisiana & Arkansas.—Coyle to Cotton Valley.....	10.2
Louisiana & Northwest.—Homer to Arkansas line, Shreveport & Red River Valley.—Shreveport to end of track, seven miles beyond Coushatta.....	52
Sibley Lake, Bristleau & Southern.—Yellow Pine toward Ringgold.....	5
Southern Pacific.—St. Martinsville Junction to Arnaudville, 23.3 miles; Thibodaux to Napoleonville, 12.83 miles; total.....	36.98
Texarkana & Shreveport.—Ida to Loma.....	5
Texas & Pacific.—Texas line near Waskom to Reisler.....	14
Total.....	165.13
Maine.	
Bridgton & Saco River.—Bridgton to Harrison.....	5.25
Franklin, Somerset & Kennebec.—Farmington to New Sharon.....	8
Portland & Rumford Falls.—Chisholms Mills to Livermore.....	6
Washington County.—Washington Junction to Eastport Junction, 86 miles; Eastport Junction to Eastport, 16 miles; Eastport Junction to Calais, 16 miles; total.....	118
Total.....	131.85
Maryland.	
Chesapeake Beach.—District of Columbia line to Upper Marlboro.....	10
Western Maryland.—Hagerstown to Pennsylvania State line.....	5.3
Total.....	15.3
Michigan.	
Chicago & Kalamazoo Terminal.—Terminal at Kalamazoo.....	2
Detroit & Lima Northern.—Extension into Detroit.....	16
Detroit & Mackinac.—Onaway to Black River.....	4
East Jordan Lumber Co.—East Jordan to timber.....	8
Escanaba & Lake Superior.—North Escanaba to Watson, 25 miles; North Escanaba to Escanaba, 5 miles; spurs 4 miles; total.....	34
Manistee & Grand Rapids.—Terminal in Manistee Manistee & Northeastern.—Shermans Mills to Honor.....	5
Manistee & Northeastern.—Scotts to Shingleton, 8 miles; McNelis to Ackers, 3 miles; total.....	11
Mineral Range.—Boston to Arcadian Mine; Dollar Bay to Grouse Point.....	9
Munising.—End of track to Acker.....	5
New line connecting Arnold and Copper Falls Mines near Houghton.....	2.75
Pearless Cement Co.—From Union City to marl beds.....	3
Total.....	104.75

Minnesota.	
Brainerd & Northern Minnesota.—Walker to Bemidji.....	31.8
Duluth & Iron Range.—Waldo to Colquett River.....	13.5
Duluth & Northeastern.—Lynds to Island Lake.....	27
Duluth & Northern Minnesota.—Knife River to end of track.....	7.5
Duluth, Messabi & Western.—Hibbing to the Prairie River.....	20
Duluth, Mississippi River & Northern.—Hibbing to Dewey Lake.....	15
Great Northern.—Deer River to Fosston, 98.6 miles; Namadji Junction to Wisconsin line, 17.2 miles; Akely to Cass Lake, 33 miles; total.....	153.5
Minnesota & Northern Wisconsin.—New main line into timber.....	6
Red Lake Transportation.—Lake Nebish to Red Lake, 10 miles; branches, 3 miles; total.....	13
Total.....	292.4
Mississippi.	
Laurel & Northwestern.—Laurel toward Raleigh.....	5
Mobile, Jackson & Kansas City.—Malett to end of track beyond Merrill City.....	21
Natchez, Columbia & Mobile.—Ruth to end of track, a mile beyond Camp Rooney.....	3
Pearl & Leaf Rivers.—Hattiesburg to end of track, 8 miles; branch, 5 miles; total.....	13
Total.....	42
Missouri.	
Cape Girardeau, Bloomfield & Southern.—Brownwood to Aquilla.....	10.5
Chicago, Rock Island & Pacific.—Rushville to Mississippi Bridge.....	1.7
Kansas & Texas Coal.—Bevier to Mine 61.....	3
Kansas City, El Dorado & Southern.—Walker to West El Dorado.....	12.9
Kansas City, Osceola & Southern.—Boilvar to Osceola.....	33.6
Kansas City, Pittsburgh & Gulf.—K. C. & Northern Connecting line from Plattsburg to Pattensburg.....	41
St. Louis Southwestern.—Gray's Point Terminal extension from Delta to Gray's Point.....	16
St. Francis Valley.—Campbell to Caligao.....	10
St. Louis & Memphis.—Paw Paw Junction to Portageville.....	14
Total.....	147.7
Montana.	
Northern Pacific.—End of track to Twin Bridges, 11.3 miles; Rockvale to Bridger, 19.2 miles; total.....	31
Yellowstone Park.—Gallatin line from Mountain side to Trail Creek.....	8.5
Total.....	39.5
Nebraska.	
Fremont, Elkhorn & Missouri Valley.—Extension around Fremont.....	3.44
Omaha Bridge & Terminal.—At Omaha.....	6
Total.....	4.04
Nevada.	
Golconda & Adelaide.—Golconda to Adelaide copper mines.....	11
New Jersey.	
Lehigh & New England.—Pochuck extension, New York State line to Glenwood.....	2
Lehigh Valley.—Spur from New Orange Branch.....	24
Total.....	2.24
New Mexico.	
Atchison, Topeka & Santa Fe.—San Jose to Santa Rita.....	4.5
El Paso & Northeastern.—Texas line to Alamogordo Junction, 66.6 miles; Alamogordo Junction to the Sacramento Mountains, 20 miles; total.....	86.6
Pecos Valley & Northeastern.—Texas State line to Portales, 21 miles; Roswell toward Portales, 61 miles; total.....	82
Total.....	173.1
New York.	
Erie & Central New York.—End of track to Cincinnati.....	9
Lehigh & New England.—Pochuck extension from Glenwood Junction to New Jersey line, 1.75 miles; branch to Pochuck, 1.25 miles; total.....	3
Lehigh Valley.—Seneca County extension, from Waterloo to Seneca Falls.....	2.75
Long Island.—Great Neck to Port Washington.....	4.19
Milford, Matamoras & New York.—Port Jervis to Pennsylvania line.....	13
New York & Ottawa.—Molra to St. Lawrence River.....	14.96
Terminal Ry. of Buffalo.—Blasdel to Depew.....	11.5
Total.....	45.53
North Carolina.	
Aberdeen & Asheboro.—Troy to Mt. Gilead.....	14
Aberdeen & Rock Fish.—Extension of Endon branch.....	4
Atlantic Coast Line.—Southeastern line, from Elwood to Ashpole.....	11.25
Cape Fear Northern.—Apex to Blanchards.....	12
Carolina & Northwestern.—Newton to Hickory.....	10
Dover & South Bound.—Dover toward Richlands.....	14
Durham & Charlotte.—Johnson City to end of track.....	7
East Carolina.—Tarboro to Henretta.....	4.1
Moore County & Western.—Craighowline to end of line.....	3
Raleigh & Cape Fear.—Raleigh through McCullers to end of track.....	16
Southern.—North Carolina Midland extension from Mocksville to Mooresville.....	27.4
Wellington & Powellsville.—End of track to Ahsokle.....	18
Total.....	140.75
North Dakota.	
Minneapolis, St. Paul & Sault Ste. Marie.—Kulm to Streeter.....	77.5
Ohio.	
Ashland & Worster.—Apple Creek to West Lebanon.....	11
Columbus, Lima & Milwaukee.—Kalida to Continental.....	10
Detroit & Lima Northern.—Columbus & Northwestern extension from near Columbus Junction to Peoria, 41 miles; Columbus Junction to St. Mary's, 22 miles; total.....	63
Northern Ohio.—Connecting line at Akron.....	1.2
Ohio Valley & Junction.—Parral to Canal Dover.....	5
Rossford & Toledo.—Ford Glass Works to the Cincinnati, Hamilton & Dayton.....	1
Total.....	91.2
Oklahoma.	
Choctaw, Oklahoma & Gulf.—Ft. Reno to Weatherford.....	46
Hutchinson & Southern.—Medford to Blackwell.....	25
Kansas & Southeastern.—Hunnell to Brame.....	7.5
St. Louis & San Francisco.—St. Louis & Oklahoma City extension from Indian Territory line to Oklahoma City.....	66
Total.....	144.5

Continued on page 371.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

We are glad to be able to publish this week drawings and a description of the Athara Bridge, which has been an international topic, if not a diplomatic incident, for a number of weeks. The assumption that a few Englishmen made, and concerning which they made a good deal of noise, that the Pencoed Works had been able to secure some special advantages or had been able to ship stock material, will not hold in the light of the information here published. The history of the negotiation is given briefly and shows that the call for bids from America was an afterthought and was in consequence of the long time which the British builders required. It shows also that in the course of the negotiation the necessity was developed for a special design which would permit the bridge to be erected as a cantilever. All of these facts are brought out, and the description now published will perhaps be of special interest because of this discussion. It has, however, a considerable engineering interest as showing ingenuity and novelty of design, consequent upon the peculiar conditions under which the bridge must be erected. There were two or three episodes which revealed the readiness of the contractors to meet unexpected conditions, and possibly this quality is stronger with our countrymen than with other nations. Among the unexpected incidents one should not overlook the fact that the works were closed for six days on account of the great storm which interrupted the delivery of material; also the other incident of the loss of a chord piece in the London harbor and the building and shipping of the new one within 18 hours after the receipt of the cable. On the whole, however, we judge that a good deal more fuss has been made over this order than is called for, and that the same thing is true of the shipments of American locomotives to England. The Englishman as an engineer and as an engineering manufacturer is no fool, as has been demonstrated pretty successfully in the last century, and American manufacturers will make a great mistake if they count upon the stupidity of John Bull to give them advantages in English or Continental or Asiatic markets.

The Compound Rail.

The compound rail continues to be invented with the regularity that marks the changing of the seasons, and the designs that come before us year by year have the familiar signs that enable the expert practitioner to diagnose instantly the stage, and the course, of the malady which has attacked the inventor. We find the same bland ignorance of the history of the art, and of commercial facts, and the same disregard of mechanical principles. The inventor projects from within himself a set of conditions which to him are human needs, and then he proceeds to meet those needs with such ingenuity as has been given to him but without informing himself what man has done or what metal has done or

can do in this special way. Having reached this point he seeks the capitalists who puts some money into patents and models, into engravings and printed circulars and the other early expenses of promoting. Then the two seek a market and slowly discover what seems to them the perversity of railroad engineers and managers, who will have nothing to do with their world-compelling invention. For a while they encourage themselves by saying that Dr. Lardner predicted that no steamship would ever cross the Atlantic Ocean and that Galileo was imprisoned for teaching scientific truth. Finally, the capitalist gets tired of the tedious work of convincing the obdurate engineers and cuts off the money and the inventor turns his talents to other fields.

These conditions are not peculiar to the invention of compound rails, but repeat themselves indefinitely. But a recent experience has suggested that it may be worth while, for the sake of a few inventors and men with money, to point out some of the fundamental fallacies of this particular kind of invention.

Within ten days a compound rail adapted especially to the uses of electric railroads has been brought before us and is a good example. It consists of two members, the head and the base, each with a part of what corresponds to the web of an ordinary rail attached to it, and these main parts are precisely like the corresponding parts of an ordinary rail. That portion of the rail which depends from the head has a deep groove, while the part which rises from the base is shaped at its upper edge into a tongue which fits this groove. The tongue and the groove having been brought together are joined by one row of rivets. The two members are applied in such a way as to break joints and thus fish plates are done away with.

This is a common type of the invention, but it has been often varied by putting the tongue above and the groove below. This, for instance, was the way in which the Bargion rail was made, which was laid in an Oakland yard a number of years ago. Still more often it is varied by making the base in two parts because of the obvious difficulty of rolling one member with the deep groove. But all of these rails are equally fallacious and hopeless, and any time and money spent on them is wasted.

The inventor of the compound rail always proposes to accomplish two things. First, to save the loss from scrapping all of the lower part of the rail when only the head is worn out, and second, to do away with rail joints.

When rails were worth \$160 a ton the first part of the inventor's proposition might have been seriously considered. To-day it can have no standing in court. When we take into account the fact that good steel rails can be bought for a little over a cent a pound and that worn rails can be sold for relaying or for scrap, it becomes at once obvious that it is not worth while to pay the extra cost of rolling the rail in two members, or in three members, as the case may be; of rolling one member with a groove which must be rolled open and afterwards closed; of drilling or punching numerous rivet holes, and finally of riveting up this continuous structure. A little arithmetic will soon show the inventor and the capitalist that his compound rail will be much more costly than the ordinary rail of commerce, even granting that it could do the work expected of it and granting that the lower member would outwear several sets of heads. So this part of the argument for the compound rail disappears.

The assumption that the compound rail will do away with fish plates or angle plates, or other ordinary forms of joint, is correct so far, but the inventor seems to overlook the fact that he is making his rail all joint. Instead of having separate parts to bring together and keep tight every 30 feet, (or 60 or 90 feet), he has a structure which is liable to get loose at any point in its length, which is precisely what did happen with the Bargeon rail alluded to above. This would depend upon the adequacy of the fitting and riveting up of the original structure, and it is conceivable that a structure could be built up which would keep tight indefinitely, but we take it that this would be a far more costly proceeding than any inventor of compound rails has yet anticipated. And this brings us to what is really the most fatal of all the objections to this type of rail.

As an engineering structure any compound rail which we have seen is inadequate to do the work which it is expected to do. It is obvious that the edges of the upper and lower members, or of the tongue and groove, could not be depended upon to endure the weight and shocks of traffic. The surfaces in contact would be so small that they would be destroyed at the outset. It follows, then, that the dependence must be upon the rivets and the

broad surfaces brought together and solidly held together by riveting. In other words, the rail must do its work in just the same way that a built up plate girder does it work. When this idea is grasped by the inventor he will probably see, if he thinks a little further, that contact surfaces an inch and a half deep, held together by one row of rivets, could not possibly do the tremendous work which a rail is called upon to perform. In short, the conception is childish.

In truth, some compound rails considerably more promising than most of the modern ones, were invented 40 or 50 years ago. In 1849 Mr. J. F. Winslow designed a rail made in two parts, 1,000 ft. of which was put in service on the Utica & Schenectady Railroad. In this form both parts carried the wheel and both parts rested on the ties. In 1850 Mr. Latrobe designed a compound rail which was laid experimentally on the Baltimore & Ohio. This was in three parts. Two parts made the lower member, and were in fact large and heavy and continuous angle plates. The third part was the head, which was received upon and between and entirely supported by the two lower parts. Winslow's rail and Latrobe's rail and various other compound rails invented about that time, were riveted together continuously and were much more robust in design than those forms which are ordinarily presented to us now. It is unnecessary to add that they failed in service, for they entirely disappeared after very short experimental use.

The compound rail of Mr. Haarmann, which is perhaps 15 years old, is better known than these ancient forms, for it has been frequently described in recent writings and has had a considerable experimental use. This, it will be remembered, is very deep in section, and the two members of which it is composed are held together by two rows of rivets. In fact, it is a built up girder. The members are practically symmetrical, both carrying the wheels and both resting on the ground, for this rail, as the reader probably remembers, is designed to support itself without cross ties. Obviously, from its depth and its solid mechanical construction, it is much more fit to do the work of a rail than the trifling affairs which are brought forward by men who have not had experience in designing structures of this sort.

All of this has been said, as we suggested at the outset, for the purpose of enlightening a few people as to the state of the art and so helping to prevent waste of energy in a fruitless field of invention.

The M. C. B. Coupler Again.

As stated in our editorial, May 19, the subject of most interest to be brought before the Master Car Builders' Association this year is doubtless that of the M. C. B. coupler, and the implied statement that no very radical action will be taken at the convention is disappointing, to some of our readers. We find, however, that the committee was appointed at the last meeting merely "to define contour lines more fully when new and when worn, and propose specifications for couplers," and these instructions might properly be taken to exclude recommendations as to standard couplers. Those who have kept posted on the coupler question know that the committee has made a searching investigation, and a valuable report is expected. But should the committee keep within its stated bounds and fail to recommend some plan for regulating the number of kinds in use, it is hard to see how the coupler situation will be materially improved unless some member proposes a plan for definite action at the meeting.

The various defects arising from improper design of details, the lack of care in the making and maintenance of couplers and the use of poor material have been discussed so frequently during the past few months that probably all mechanical men are now impressed with the need for improvements and will be prepared to accept any recommendations the committee may make as to these things. However, as every one knows, this is not all. Making the best specifications, providing means for determining when couplers conform to standard lines and arranging for improvements in details do not in themselves solve the coupler problem, or relieve the Association of responsibility for the present unsatisfactory state of affairs.

All these things are, of course, important, but unless we go further there still remains the same opportunity for such roads as are so disposed to use the cheapest and poorest couplers, not only on their own cars, but on cars of other roads which may reach their repair tracks. Not only is there the same opportunity to replace a high-price coupler of a foreign car with an inferior one, but the margin of profit on the transfer remains unchanged; it is generally known that these transfers are not uncommon. It is also a rather notorious and well-known fact that there are roads which use the best couplers for their own cars, but buy for renewals of foreign

cars the cheapest ones to be had, charging the car owners for them at an advanced price; under the present interchange rules these things are permissible.

We can hardly see how, as one railroad club has suggested, the law of evolution can be depended upon to eventually weed out the poor couplers and reduce the number of kinds in use so long as these conditions prevail. It would rather seem that some quicker and surer plan should be devised to reduce the multiplicity of couplers where so important a factor as the first cost is directly opposed to the working of the law; it is quite possible that had all couplers a common price the present tangle would never have come about.

Should the Association see fit to limit the number of kinds of couplers to be used for renewals at interchange points in some arbitrary manner it would incidentally assist those mechanical men who favor good couplers, but whose recommendations are now overruled by the purchasing departments. And even if nothing more is done, a good deal would be gained by changing the rules so as to remove the premium on the use of the cheapest couplers, and the opportunity for sharp practice, which present conditions favor.

The Journal, of the German Railroad Union, discussing some difficulties with signal lights, which seem to be quite similar to those encountered in this country, reports some photometric measurements of the intensity of different lights. The attempt was made, but apparently without satisfactory result, to use larger lamps, or reflectors with ordinary lamps, in order to increase the strength of the lights. The results of the experiments, as reported, are as follows (1 litre = 1.06 qt.):

	Candle power without reflector.	Candle power with reflector.	Quantity of petroleum required in litres per hour
Signal lantern with open burner.....	30	70	0.016
Round wick burner, 18 mm. (7 in.) diameter, with chimney.....	60	210	0.024

The experimenters found—that any American railroad man of experience could have told them—that a blue glass transmits only a very small portion of the light of a flame. The percentage was from 0.5 to 1.5. The red glass tried transmitted from 5 to 10 per cent. of the light and green from 15 to 20 per cent. It appears that the Germans have been substituting green lights for white as the all-clear indication; and, as in England, the lights on the distant signal are made the same as those on the home signal. In Germany, however, the lamp in the distant signal is usually placed only about 10 ft. above the ground, while the lamp of a home signal is fixed about 20 ft. high. Complaint is made that the difference in height is not of itself sufficient to distinguish one kind of signal from the other kind, "especially in foggy or stormy weather." It is not quite apparent why this should be so. It is true that fog obliterates surrounding landmarks, but, on the other hand, the fog makes it necessary to read signals at short range, and the shorter the range the easier will it be to correctly estimate the height of a light. In view of the fact that three railroads in America are now using green for all-clear (the Chicago & Northwestern, the Metropolitan Elevated of Chicago, and the New York, New Haven & Hartford), each with a different kind of distant signal, we venture to suggest to our German friends that they might do well to copy American instead of English practice in this matter.

The Prussian Minister of Public Works, in submitting his railroad estimate to Parliament, said that prices of supplies have risen. The standard price of coal, which had been \$2.14 per ton, for the two years beginning with July last, is \$2.28. The contract price for rails had been \$25.94 per ton. By the new contract, running till 1902, it is \$28.08. Steel ties had cost \$24.04 per ton, and are now \$26.18. A better quality of rails is secured, however. They are chiefly made by the Thomas process. Formerly by this process they could not be made as hard as was desirable. Now any degree of hardness required is secured. A considerable quantity of the new rails, designed for the lines of heaviest traffic, will weigh 82 lbs. per yard—much heavier than the old sections. About 700 miles of such track will be laid this year.

NEW PUBLICATIONS.

Surveying—A Group of Belated Reviews.

A Text-Book of Plane Surveying. By William G. Raymond, C. E., M. Am. Soc. C. E.; Professor of Geodesy, Road Engineering and Topographical Drawing in the Rensselaer Polytechnic Institute, New York: American Book Co., 1896. Octavo, 485 pp.; illustrations, six colored plates and index. Price, \$3.

Professor Raymond's purpose, as expressed in this title, was to make a text-book, not a hand-book, or a treatise, and to make his book serviceable to those beginning the study of the subject. This scheme

has permitted a certain elaboration not possible in a hand-book, but much less than that of Prof. Johnson's well-known treatise and has led to the introduction of numerous problems by which the student can ascertain whether or not he has really possessed himself of the information and the principles which the author has sought to convey, and has permitted an admirable typography. The work is divided into two main books. The first treats of instruments, their adjustments and uses; the second of general surveying methods. The appendices are a paper on the Judicial Functions of Surveyors, by Judge Cooley; a paper on The Ownership of Surveys and What Constitutes a Map, by Prof. Raymond; a brief Description of Base Lines and Principal Meridians governing the Public Surveys, and finally a good collection of tables. The colored plates are examples of topographical and mine surveys.

Book I fills 200 pages, and treats carefully, clearly and with sufficient detail of all the instruments used in ordinary surveying, including the stadia and the solar-transit; and the last chapter of the book treats, too briefly, perhaps, of the sextant. Not a great many surveyors are likely to need this wonderfully useful instrument, but those who do need it need it badly, and the theory of its uses and adjustments is not hard to acquire. To learn to observe well with the sextant, however, requires a good deal more practice than the level or the transit, but it is not difficult to learn to get time and latitude, and it is often a handy and always an interesting accomplishment. Furthermore, one may often find it convenient to measure horizontal or approximately horizontal angles with a sextant, as, for instance, in locating soundings from a boat.

Chapter VI. of Book I. is on Land Survey Computations. Here Prof. Raymond introduces the more logical and precise terms "latitude difference" and "longitude difference," instead of the old-fashioned "latitude" and "departure." These terms are also used by Profs. Merriman and Brooks in their "Hand-book," published about the same time as Prof. Raymond's book.

The development of the methods of computation is general, concise, and elegant, but no claim is made to originality. The merit is in the compact and clear arrangement. In this chapter the uses of the planimeter are explained and there is an excellent section of 20 pages on the slide rule, written by Prof. Crockett.

Book II. is on General Surveying Methods. Here 120 pages are given to land, topographic, hydrographic and mine surveying and to earthwork computations. An appendix of 19 pages gives problems applying the principles taught in the preceding chapter.

Twenty-two pages are given to 14 useful miscellaneous tables, including the fundamental trigonometric formulas and formulas for the solutions of triangles.

Since the time (two or three years ago) when this book came to us for review the publishers have accumulated quite a mass of very appreciative letters about it from professors and instructors, most of whom have adopted it as a text-book.

A Hand-book for Surveyors. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University, and John P. Brooks, Instructor in Civil Engineering in Lehigh University. First Edition, Pocket Book, 128 pp. text, 114 pp. tables. New York: John Wiley & Sons, 1895. Price, \$2.00.

This little book is convenient in form and full of information for the land surveyor. It is for the surveyor what the pocket books of Henck and Shunk are for the railroad engineer.

Chapter I. contains a number of useful theorems of geometry and formulas for the solution of triangles. Angle, azimuth, coordinates, latitude and longitude are defined and their applications illustrated. The remainder of the chapter treats of areas, elevations and errors in measurements. In the computation of areas by latitudes and longitudes, the old terms latitude, departure and double meridian distance have been replaced by latitude difference, longitude difference and double longitude, respectively; terms which are undoubtedly more correct but less convenient for the surveyor familiar with the old terms.

In Chapter II. the various surveying instruments are described. Field methods are briefly outlined and complete notes for a farm survey given. The methods for United States Public Land Surveys are mentioned in this chapter, but in so brief a manner as to be of little practical value to the student or the surveyor.

Leveling and triangulation are treated in Chapter III., which also contains directions for adjusting the level and the transit. The errors of these instruments are briefly discussed and methods outlined for their detection. The methods of triangulation and base-line measurement are treated with sufficient fullness for the use of the surveyor in ordinary practice, where small areas are to be surveyed.

Stadia methods in the field and the office are described under the head of Topographical Surveying, which is the subject of Chapter IV. Examples of topographical maps "large scale" and "small scale," are illustrated and the proper degree of precision with which measurements for each should be made discussed.

The text concludes with a few pages upon the determination of a true meridian. Supplemental tables give very complete data for the determination of the times of elongation and culmination of Polaris up to and including the year 1899.

The following tables fill 114 pp. of the book: Natural Sines and Cosines, Natural Tangents and Cotangents, Lengths of Circular Arcs, Daily Variation of the Magnetic Needle, Degrees of Longitude and Time, Elongations and Culminations of Polaris, Azimuths of Polaris at Elongation, Metric and English Measures, Lengths of Arcs of Latitude and Longitude, Reduction of Inclined Distances to the Horizontal, Stadia Reductions of reading 100, Logarithms of Numbers, Logarithmic Sines, Cosines, Tangents and Cotangents.

This book would seem to be especially useful in technical schools, which devote considerable time to field practice in surveying, as well as to the engineer in the field.

A Treatise on Surveying, Comprising the Theory and the Practice.—Part I. Land Surveying and Direct Levelling, by William M. Gillespie, LL. D., formerly Professor of Civil Engineering in Union College. Revised and enlarged by Cady Staley, Ph. D., President of Case School of Applied Science. 8vo.; 425 pages of text, 127 pages of tables. New York: D. Appleton & Co. Price, \$2.50.

This excellent old book upon land surveying has been brought up to date by President Staley, who has followed the clear plan of statement of the original publication in descriptions of instruments and methods. One of the best features in the book is the collection of problems in surveying, with various methods of solution.

In Chapter I. General Principles and Fundamental Operations are considered. Commencing with the location of a point by five distinct methods, the student is introduced to five corresponding systems of surveying. Chains, tapes and rods are next described as measuring instruments and directions for making surveys with their use alone given.

The methods of surveying "without instruments" (too often omitted in text-books and by teachers) are described and examples given. Methods for determining areas arithmetically, geometrically, instrumentally and trigonometrically are also given in this chapter. Chain surveying is the subject of Chapter II. and compass surveying is considered in Chapter III. The chapter on transit surveying contains the usual subject matter of descriptions, adjustments, field methods, etc. In connection with stadia methods a very complete table for the reduction of stadia readings has been given at the end of the book, arranged on the plan of the old traverse tables. Reductions for angles varying by one minute up to twenty degrees can be made by simple addition.

Chapters V. and VI. treat of obstacles in angular surveying, the supplying of omissions, laying out land, parting off land, dividing land, etc. Chapter VII. is especially clear and complete upon the methods employed in the U. S. Public Land Surveys. The chapter upon Direct Levelling contains all the information necessary for work not requiring special instruments of great precision. The tables are of the usual form, with the exception of the stadia table mentioned above.

As a text book or reference book on land surveying alone this is not excelled. The subjects "Railroad Surveying," "Hydraulics" and "Computations of Earthwork," found in many books upon surveying, are omitted.

Sewer Design. By H. N. Ogden, C. E., Assoc. M. Am. Soc. C. E. Assistant Professor of Civil Engineering, Cornell University. xi + 234 pages. 12mo. New York: John Wiley & Sons. 1899. \$2.

Mr. Ogden has prepared a useful and interesting little book. It is made up almost entirely, as he explains in his preface, from a course of lectures given by him in the College of Civil Engineering, Cornell University. The first chapters of his book deal with the different systems of sewerage and with the preparation of maps and data. He then takes up the subject of rainfall, the proportion of it reaching the sewers, and mathematical formulae expressing the relations between rainfall, slope, drainage area, etc. These chapters are followed by others dealing with the social elements of the problem; that is, estimates of population and of the amount of sewage per head. Chapters follow on flow through sewers and others on cross sections, plans of layouts and methods of flushing.

Advanced Metal-Work.—In Three Parts, Part I. The Speed-Lathe. By Messrs. A. G. Compton and J. H. De Groodt. New York: John Wiley & Sons; London: Chapman & Hall, Limited. 4½ x 7 in., pages 134, illustrated. Price, \$1.50.

This book contains lessons on the speed-lathe, engine lathe and planing-machine for use in technical and manual training schools and for amateurs. The lessons in the book follow closely the course of instruction as given at the College of the City of New York, which has been gradually and carefully developed during 13 years.

The instructions are simple, clear and readable. No attempt is made to develop extensive / any one subject, but rather to choose a few representative and important topics, and by explicit directions en-

able the worker to obtain a pretty clear notion of many of the uses and the principal parts of lathes and planing machines.

By following closely the instructions, the beginner should, in most cases, be able to do the work outlined in the book, although the authors state that the lessons are not supposed to dispense with "the helpful hand and watchful eye of an instructor."

But the authors have a view to a broader instruction than one would get by standing over a lathe or making a pattern by fixed rule. The following note appears in the introduction:

The authors believe that the mechanical skill alone which a course of manual training imparts is only a part, and not even the most valuable part, of the training which the workshop and laboratory can give; the power of intelligent reading and of accurate and orderly description is equally important, and so is the power of foreseeing the difficulties that will arise in the course of a given operation and of devising means to evade or overcome them. These powers it is hoped that these lessons may help to impart.

The Transition Curve. By Offsets and by Deflection Angles. By C. L. Crandall, C. E., Professor of Railway Engineering, Cornell University; M. Am. Soc. C. E. Second edition, revised and enlarged. vi + 99 pages. 16mo. Morocco, \$1.50. New York: John Wiley & Sons.

The first edition of this book was published in 1893, and it is doubtless pretty well known to those of our readers who have occasion to use, or to know about, the transition curve. In the second edition the table of offsets and other data has been extended to circular curves of short radii. A table giving the actual deflections in degrees and minutes for a large range of curves has been added. This table in its general form was suggested by the tables used on the Burlington & Missouri River Railroad. A five-place table of sines, co-sines, tangents and co-tangents has been added, so that the simple curve problems involving transition curves can be worked in the field without the use of the regular field books.

TRADE CATALOGUES.

Malleable Iron.—We have received from Messrs. Pratt & Letchworth, of Buffalo, N. Y., a copy of a remarkable pamphlet, being nothing less than a verbatim report of an address on malleable iron by Sir Ponsonby Hawkesworth, A. R. A., K. C. B., etc., delivered before the British Society of Uncivil Engineers on his return from a visit to the United States. The notes were evidently procured by bribing the Secretary of that society, and the pamphlet is printed for private and confidential circulation; at least we are led to believe that it is. Probably, however, a copy can be extracted from the Secretary of Pratt & Letchworth by the use of a malleable iron corkscrew, but one who wishes to get a copy should begin proceedings at once, for the pamphlet is unquestionably rare.

It purports to be illustrated. We judge that when Sir Ponsonby was held up by the jeers of his indignant audience the stenographer amused herself by making drawings with which to fill the pages of her notebook. These have been conscientiously reproduced in the foundry at Black Rock and the blocks from which they are printed are remarkable specimens of the founder's art.

Sir Ponsonby's detailed story was new and most amazing to his British hearers, but to us, of course, most of it is well known, for in the nature of things we know almost everything. That is part of the business, and that is why we are paid \$50,000 a year to sit in this chair. Furthermore, we have had some experience with malleable iron, having lost three fingers through the bursting of a Parker gun made of malleable iron and having bought several malleable watch springs of Tiffany. But there are two matters in this pamphlet new even to us. One of these is the method of eliminating sulphur and phosphorus from the melt. It appears that at the proper moment a small dose of KSO_4 ($\text{C}_2\text{H}_4\text{O}_2$) is injected hypodermically, and this finishes the sulphur and the phosphorus. If any man does not understand the reaction which takes place he can ascertain by inquiring of the accomplished fizzleist at the nearest drug store. The method of segregation by which blowholes are disposed of is also new, but this we shall not try to describe. It can only be understood by examining the engravings.

In closing, we wish to warn the reader not to put too much trust in Sir Ponsonby's scholarship. He is a keen observer and an accurate reporter, but he is very weak as a classicist. For instance, in speaking of the fact that malleable iron was unknown to the ancients, he quotes Julius Caesar as saying, when he was preparing for his campaign in Gaul: "Now if I only had a piece of malleable iron." Obviously, Sir Ponsonby has been misled by the pseudo-Latin of some of the monkish writers. The passage reads, as every really well-prepared freshman knows: "Oh, that I had a set of semi-steel knuckles with which to smash the face of the Helvetii." This error is not pointed out in any spirit of criticism, but as an act of justice to our readers; for we hold it as one of our most sacred duties to see that they are not led astray by false latinity.

Nash Gas and Gasoline Engines.—The National Meter Co., of New York, has issued a small catalogue descriptive of the Nash engine, and naming some of

its leading applications. These engines range in output from $\frac{1}{2}$ to 50 actual horse power. The 40 h. p. machines and over have three cylinders; those of the smaller sizes have two, and single cylinder engines range from $\frac{1}{2}$ to 15 actual horse power. The principal uses mentioned are for electric lighting and power, special designs having been made for engines direct connected to dynamos. Tests here mentioned have shown that with gas, receiving power from a direct connected dynamo with the Nash engine using lights of the quality and price of the New York City gas, before the recent reduction was made, that an incandescent lamp 16 candle power can be run for one-fifth of a cent per lamp hour. Some belt driven electric lighting plants are also mentioned, and the Nash gas engine and triplex pump for small water works, railroad tanks and pumping service are illustrated and described. Reference is also made to a test of a Nash lighting plant at Stevens' Institute, where it was shown that less than 30.5 cubic feet of 701.3 B. t. u. gas were consumed per k. w. hour, and the dynamo in combination showed an efficiency of about 83 per cent.

A Few Words About Mechanical Stokers.—In this 32-page catalogue, issued by the Westinghouse Machine Co. and Westinghouse, Church, Kerr & Co., the Roney mechanical stoker is described briefly. This device consists of a hopper for receiving the coal, a set of rocking stepped grate bars, inclined at an angle of 37 deg. from the horizontal, and a dumping grate at the bottom of the incline for receiving and discharging the ash and clinker. The dumping grate is divided into several parts for convenience in handling. The different parts of the stoker are shown, and mention is made of the characteristic feature of the Roney stoker, that of accessibility. The catalogue contains many suggestions to users of large amounts of coal and the time given to looking through it will be well spent.

Improved Crushing Rolls.—A catalogue which has evidently been arranged with more than usual care on the subject of mining machinery, with special reference to crushing rolls, has been issued by the Gates Iron Works of Chicago. This company favors a comparatively low speed for crushing rolls, and in this catalogue some reasons for this practice are discussed with care. The rolls made by this company are heavy, and all journals extra large and well protected. This catalogue also contains many suggestions for the erection and working of the different styles of crushing rolls, and mention is made of some advantages of dry crushing.

New Railroad Building in 1898.

(Continued from page 371.)

Oregon.	
Astoria & Columbia River.—Clifton to Goble.....	35.3
Columbia Southern.—Wasco to Moro	18
Coos Bay, Roseburg & Eastern.—Cemetery to Beaverton	2.25
Total	55.55

Pennsylvania.	
Allegheny Junction.—Allegheny Valley RR. to Pittsburgh Junction RR.	25
Brookville.—Smith's Camp to Payne Mill, 1 mile; W. P. Park to Shaffers, 0.3 mile; Middle Brookville Junction Summit, 0.3 mile; total	2.1
Buffalo, Rochester & Pittsburgh.—Allegheny & Western extension from Lindsay to Loop.....	12
Cammal & Black Forest.—Pump Station to Steeley's Camp	4.5
Clearfield Southern.—Porters' Station to Driftwood	8.5
Cornwall.—Branch to Colebrook Furnace Plant... Delaware, Susquehanna & Schuylkill.—Extension of Oneida branch to New Harwood	7.7
Elk & Highland.—Coon Run Junction to Maple Run	7.45
Kinzua & Tiona.—Rogers to Stewart.....	4
Kushequa.—Kushequa to McKean's.....	7
Medix Run.—Little Medix to Beechville.....	2
Milford, Matamoras & New York.—New York State line through Matamoras.....	57
Mt. Jewett, Kinzua & Rittersville.—Mead Run extension from Garret through Tielken, 4.5 miles; Tielken branch to Black Snake, 1 mile; total	5.5
New Haven & Dunbar.—Hill Farm to Ferguson... New York & Pennsylvania.—Oswego to Millport... New York Central & Hudson River.—Beech Creek extension from Patton to St. Boniface.....	5.8
North Bend & Kettle Creek.—Lebo Run to Black Forest, 3 miles; Ewings to Francis Hollow, 1 mile; total	3
Pennsylvania.—Cumberland Valley extension from Waynesboro to track of the Geiser Manufacturing Co., 0.84 mile; Scalp Level extension, 2.9 miles; Glen Campbell, west, 3 miles; total	4
Pennsylvania Joint Lumber Co.—From Sinnemahoning up Grove Run	6.74
Pittsburgh & Lake Erie.—Speer's Run Branch extension from Belle Vernon to Coal Mines..... Reynoldsville & Falls Creek.—London Mine to Pancoast Mine, 0.4 miles; Rathmel to Maplewood Mine, 0.2 miles; Rathmel to Feeley River Mine, 1.2 miles; total	5
Salisbury Branch.—West Salisbury southeast, 3.34 miles; branch to Niverton, 0.77 miles; total	2
South Branch.—Mead Run to Jerrys, 5 miles; branches, 5 miles; total	1.8
Tionesta Valley.—Lamonville to end of track.... Tuscarora Valley.—Port Royal to end of track... Union.—Bessemer to Homestead, 4.85 miles; branches, 9.1; total	4.11
Valley Connecting.—Connecting line in Mercer County	10
Western Maryland.—Washington & Franklin cut-off from Maryland line toward Altenwald.....	8
Total	13.95

South Carolina.	
Pickens.—Pickens to Easley	9
Seivern & Knoxville.—Westmoreland to Batesburg	7
Total	16

South Dakota.	
Wyoming & Missouri River.—Belle Fourche to State line	11

Tennessee.	
Forge Mining Co.—Roan Mountain to Mines.....	2
Tennessee & Cumberland River.—End of track to Tennessee Ridge	8
Total	10

Texas.	
Beaumont Wharf & Terminal.—Extension of belt line around Beaumont	4
Cane Belt.—Eagle Lake to Bonus.....	11
Chicago, Rock Island & Pacific.—C. R. I. & Texas extension from Bridgeport to Jacksboro.....	27.25
El Paso & Northeastern.—El Paso to Galveston, Harrisburg & San Antonio crossing, 0.9 mile; Ft. Bliss to New Mexico line, 14.6 miles; total.....	15.5
El Paso Southern.—In El Paso.....	3.75
Gulf & Brazos Valley.—Peck City to Cue Mine... Gulf, Beaumont & Great Northern.—Kirbyville to end of track	3
Jasper Southern.—Kirbyville to Jasper.....	5
Marshall, Timpon & Sabine Pass.—Russellville to Carthage	20
Moscow, Camden & San Augustine.—Moscow to Camden	12
Orange Cane & Pine Belt.—Call to North.....	6
Pecos Valley & Northeastern.—Amarillo to Indian Territory line	3
Southern Pacific.—Austin & Northwestern branch from near Fairfield to Sandstone Mountain.....	95
Texas Pacific.—Waskom to Louisiana line.....	1.33
Texas State.—Extension west	3.75
Total	207.58

Utah.	
Rio Grande Western.—Extension of Jennings spur Salt Lake & Ogden.—Main track extension from mile post 16	8.75
Utah & Pacific.—Milford to Sulphur	25
Total	33

Vermont.	
Burlington & Hinesburg.—Burlington toward Hinesburg	47
Total	2

Virginia.	
Alberene.—End of track to Alberene.....	9.5
Norfolk & Portsmouth Belt.—Berkeley to Port Norfolk	6.5
Norfolk, Virginia Beach & Southern.—End of track to Munden Point	15
Richmond, Petersburg & Carolina.—Petersburg to Butterworth's	20
Total	51

Washington.	
Northern Pacific.—Extension to Hoquiam.....	4.2
Portland, Vancouver & Yakima.—Extension toward North Yakima.....	2.5
Shelton Southeastern.—Summit toward Prairie Lake	5.5
Western American Coal.—Carbonado to Fairfax... ..	7.5
Total	19.7

West Virginia.	
Clendennin & Spencer.—Ash Camp to Odell.....	9
Cheat Valley.—Rowlesburg to end of track.....	6
Deep Water.—Deep Water to Robeson.....	4
Holly River & Addison.—Holly River to Diana... Little Kanawha.—Elizabeth to Palestine.....	5.5
West Virginia Central & Pittsburgh.—Beverly to Huttonsville	4
Total	11

Wisconsin.	
Ashland, Siskiwit & Iron River.—Flag River to Lindsay	39.5
Big Falls.—Junction to Narska	14
Chicago & Northwestern.—Extension of belt line around Manitowoc	6
Chippewa River & Menominee.—Extension of main line	2
Fairchild & Northeastern.—Greenwood to Shilling Great Northern.—Minnesota line to Colquet.....	2.5
Washburn, Bayfield & Iron River.—Completion of line from Washburn to Iron River and to Bayfield	4.5
Total	10.2

Wyoming.	
Wyoming & Missouri River.—South Dakota line to Aladdin	23
Total	62.2

CANADA.	
Canadian Pacific.—Crow Nest Pass extension from end of track to Kootenay Landing, B. C., 217 miles; Stonewall branch extension from Stonewall, Man., to Teulon, 19 miles; Pipestone branch extension from Reston, Man., to Carlyle, 26 miles; total	262
East Richelieu Valley.—Henryville to St. Thomas, Que.	10.5
Intercolonial.—North Sidney to water front.....	7.8
Irondale, Bancroft & Ottawa.—Bancroft to end of track	2.25
Lake Manitoba Ry. & Canal.—Sifton Junction, Manitoba, to end of track	55
L'Epiphanie & L'Assomption.—L'Assomption, Que., to St. Paul, 6 miles; St. Paul to Charlemagne, 5 miles; total	11
Manitoba & Southeastern.—St. Boniface, Man., to end of track	46
Newfoundland.—Brigus to Tilton, 15.5 miles; Harbor Grace to Carbonear, 7.25 miles; total	22.75
Northern Pacific.—Brandon branch from near Belmont to Hartney, Man.	46.5
Ontario & Rainy River.—Stanley, Ont., to end of track	10
Ottawa & New York.—Hawthorne to O. & N. Y. Junction, 3.4 miles; Grand Trunk Junction to Cornwall Bridge, 1.1 miles; total	4.5
Pembroke Southern.—Pembroke, Ont., to Golden Lake	21
Restigouche & Western.—Campbellton to end of track	10
New line of J. K. Booth of Ottawa, from Egan estate to McAulay Lake	5
Total	507.23

MEXICO.	
Campeachy & Calkini.—Merida, Yucatan, to Campeachy	100
Chihuahua & Pacific.—Chihuahua toward Guerrero Coahuila & Zacatecas.—End of track to Concepcion de Oro	20
Jalapa R.R. & Power.—Talata to Teocela.....	36
Mexican Central.—Jimenez to Parral.....	18.6
Mexican Industrial.—Belt line around the city of Mexico	55
Mexican International.—Reata to Monterey.....	5.9
Mexican National.—Patzcuaro to Escondido.....	72
Mexican Southern.—Tlacotepec & Huajuapam de Leon extension from Tlacotepec to Las Pillas, Puebla	30
Mexico, Cuernavaca & Pacific.—Cuernavaca to Puente de Ixta, 27.5 miles; Los Amates to end of track, 18 miles; total	19
Pachuca, Zacualtipan & Tampico.—Apulco to end of track	45.5
Potosi & Rio Verde.—San Luis Potosi toward Rio Verde	18.7
Rio Grande, Sierra Madre & Pacific.—Extension at Ciudad Juarez, 6 miles; branch to San Pedro mines, 4.1 miles; total	20
Torres & Prietas.—Torres, Sonora, to Santa Cruz	4.1
Total	50

TECHNICAL.

Manufacturing and Business.

The Toledo Foundry and Machine Co., Toledo, O., has just received another order for one of their Victor steam shovels to be sent to Yokohama, Japan.

The officers of the H. K. Porter Co., which has succeeded H. K. Porter & Co., as noted last week, are: H. K. Porter, President; W. E. Lincoln, Vice-President; W. E. Martin, Treasurer; C. L. McHenry, Secretary; E. P. Lord, General Manager and Superintendent; D. E. Ferguson, Purchasing Agent. The company is building a new erecting shop 160 ft. x 66 ft., to be equipped with two 25-ton electric traveling cranes, and doubling its electric plant, installing an additional 125-h. p. Westinghouse gas engine and general electric generator.

Valentine & Company have acquired the Lawson Varnish Company of Chicago, Boston & New York. The management of both companies has, in the past, been largely identical. The entire staff in all departments of the Lawson Varnish Company will be retained, and Charles E. Morrill, hitherto President of that company, has become one of the Vice Presidents of Valentine & Company.

A recent press dispatch from Chicago stated that a new steel car plant was to be built by the Pressed Steel Car Co. in or near that city. This probably originated from the fact that the company is to enlarge its plant at Joliet, Ill. A large tract of land has been bought and the old Fox plant, now the Western plant of the Pressed Steel Car Co., is to be enlarged to at least three times its present capacity. Ground has been broken and work will be pushed. The capacity of the enlarged plant, when completed, will be 30 pressed steel cars a day in addition to a proportionate increase in the capacity for trucks, bolsters and other pressed steel parts. The total investment will aggregate \$500,000, and about 1,600 skilled workmen will be added to the force. When this plant is completed the capacity of the various works of the company will be over 100 pressed steel cars a day. The new plant at McKee's Rocks, Pittsburgh, which will double the capacity of the Pittsburgh plant, will be in operation some time in July and will have a capacity of 40 pressed steel cars a day, in addition to a large bolster and truck capacity. The Joliet plant is designed to take care of a share of the Western demand. Since the first pressed steel car was built, orders filled and unfilled amount to about 15,000 cars.

The Pennsylvania Car Wheel Co. has requested us to deny the rumor to the effect that the company has sold out. To enable it to further enlarge its business this year additional property has been taken and the capital stock has been increased from \$100,000 to \$200,000 paid in. It is probable that these changes have given rise to the rumor.

The Anniston, Ala., shops of the Illinois Car and Equipment Co. have been sold to the Southern Car and Foundry Co.

The Chicago Pneumatic Tool Co. has been awarded a large contract for pneumatic tools for the League Island Navy Yard, Philadelphia.

Iron and Steel.

At a meeting of the stockholders of the recently consolidated Lebanon Iron Co. and the National Bolt, Nut and Rivet Works, of Lebanon, improvements and extensions to be made at once were authorized.

Chicago papers report that the Illinois Steel Co. has let contract for a new concrete dock to Hausler & Lutz, of South Chicago, the dock to be 1,100 ft. long, 140 ft. wide and 21 ft. deep, to cost \$150,000.

New Stations and Shops.

The large car shops which the Chicago Great Western is building at Oelwein, Ia., are nearing completion.

The freight depot of the Mexican International, together with eight cars, was destroyed by fire May 14.

The Isthmus Canal Commission.

It is likely that the commission on the Isthmus canal will be appointed before this issue of the Railroad Gazette reaches the reader. The names of the commission have been almost certainly known to a considerable number of people for several weeks, but it has seemed a little risky to publish them. We believe, however, that no mistake will now be made in giving the composition of the commission as follows: J. G. Walker, Rear Admiral, U. S. N., retired; Peter C. Haines, Colonel Corps of Engineers, U. S. A.; Louis M. Haupt, Philadelphia, all of the present Walker Commission. Additional members: Alfred Noble, of Chicago; Virgil G. Bogue, of New York; George S. Morison, of New York; Thomas W. Symons, Major Corps of Engineers, U. S. A.

This commission has at its disposal ample funds and is instructed to make a general examination of the whole problem and will by no means confine itself to the Nicaragua route. Its studies must cover all possible canals across the Isthmus. It is hardly necessary to say that the commission is one of extraordinary strength. Such elements of weakness as it contains will not count for much in the ultimate result, and we should expect a report which will be

so far final as in the nature of things such a report can be.

Steel Cars at the Conventions.

The Pressed-Steel Car Company has arranged to have a comprehensive exhibit of its various styles of cars at the Old Point Convention. Not only will their types be shown in new cars, but a complete series of cars manufactured early in the history of the company and since then in use by prominent roads will be exhibited. The cars will be sent to Old Point in the condition in which they are received from the roads. Of the old cars to be on view the Pennsylvania Company will contribute one; the Baltimore & Ohio, one; the Pittsburgh, Bessemer & Lake Erie, one self-clearing hopper, and the Lake Superior & Ishpeming, a designed ore car.

Another Highway Bridge Wreck.

The newspapers describe the fall of a bridge in Indianapolis under a motor car and two gravel cars of an electric street railroad. From the pictures it was evidently a bow string girder with cast iron upper chord. The newspaper accounts say that the bridge has been considered unsafe for a number of years. Probably there is little engineering interest in the incident, but it is another of the somewhat numerous warnings that the electric railroad officers have received within the last two or three years.

Raising the Line Voltage by a Storage Battery.

In our issue of May 12, page 340, reference was made to the installation of a storage battery on the road worked by the Waterloo & Cedar Falls Rapid Transit Co., Waterloo, Ia. This company operates local lines in Waterloo and Cedar Falls and an inter-urban line connecting the two cities, a distance of about six miles. The power house is at Waterloo, and the line voltage at Cedar Falls was low, so that the cars moved slowly and the motors were being injured. The President of the road, Mr. L. S. Cass, states that by putting in a storage battery at Cedar Falls they can hold the voltage up and are getting satisfactory results from the plant. The cars on this road, however, do not carry a storage battery, as might be inferred from a former note, the overhead wire being used throughout.

The Electrical Exhibition in New York.

The annual electrical show held in New York is now open at Madison Square Garden, New York City. These exhibitions always have something of interest and usually something novel. Last year the Moore's vacuum tube lighting attracted a large number, and this year the horseless carriages are probably of more general interest than the other exhibits. A number of makers have each from two to five or six carriages of different styles, which give a pretty fair idea of what is being done in this industry at the present time. The decorative effects at the Garden are especially pleasing, particularly in the evening. One good engineering exhibit, however, should have special mention, that of the Cling-Surface Mfg. Co., of Buffalo. This company has two dynamos of equal capacity, the one driven by a belt without any dressing and the other by a belt with the "Cling-Surface" preparation. Each dynamo generates currents for electric lamps and each lights an equal number of lamps. A spring balance is attached to the generators (which are on movable bases), so as to indicate the tension on the belts. When the dynamo which is driven by the belt which has an application of "Cling-Surface" runs loose, so that the upper side touches the lower, the belt transmits much more power than is transmitted by the untreated belt running tight. Prof. Carpenter's tests at Cornell University, as reported in our issue of May 5, showed that 40 per cent. more power could be transmitted by the treated belt running loose than the untreated belt running tight. Interesting experiments were shown at the exhibition which readily proved that an application of "Cling-Surface" made it possible for the belt to transmit its load better at low than at high tension. Among the exhibitors are the H. W. Johns Mfg. Co., Jos. Dixon Crucible Co. and the Miles Tools Works.

The Rhode Island Locomotive Works.

We announced some time ago the purchase by the International Power Company of the Rhode Island Locomotive Works at Providence. That company is now in the field for the manufacture of steam locomotives, either single expansion or compound, and the works have a capacity to build 250 engines a year. But this is only the beginning of the work which the company is undertaking. Besides the Rhode Island Locomotive Works it has bought the American-Wheelock Engine Works, at Worcester, and has leased, subject to purchase, the entire property of the Corliss Steam Engine Works, at Providence, and it is the intention to go into engine building on a large scale and in a varied way. That is, locomotives to be worked by compressed air and for all sorts of purposes will be built; also compressed air engines for street railroad service, and for motor cars, and compressed air motors for all sorts of horseless vehicles. Besides that it is the intention to continue the work of building stationary steam engines and to build also air compressors. We judge that the expectation of the International Power Company is that considerably the largest part of its

business will be in building trucks to be propelled by compressed air. The company has now an order for 1,000 such trucks from the New York Auto Truck Company and within a few days has taken an order for a thousand trucks for Boston. The company controls the foreign patents of the Hoadley-Knight compressed air system, covering, we believe, all applications of compressed air as a motive power, while in the United States it controls these patents so far as they concern everything but the propulsion of street cars. It is obvious at once that the use of compressed air motors for propelling trucks and all sorts of vehicles in city streets may open up a field vastly greater than all other possible fields for the use of compressed air as a mode of propulsion. Here, we take it, is where the company looks for its greatest business, although the street car business may develop into a very important one, and, of course, the building of steam locomotives and stationary steam engines is a safe and staple business.

THE SCRAP HEAP.

Notes.

The State taxes assessed against railroads in Michigan this year amount to \$1,087,617, an increase of \$145,802 over the amount paid in 1898.

The State Railroad Commissioners of New York have lately inspected 50 highway crossings on the line of the Long Island Railroad with a view to considering the practicability of separating the grades.

The Philadelphia & Reading has discontinued all passenger service on the line from Conshohocken to Oreland, nine miles. The road was built chiefly for freight, but there has hitherto been one passenger train each way daily. Lately an electric road has taken away some of the passenger business.

Press dispatches from Toronto and Montreal of Monday last report that the track laborers on the Grand Trunk all the way from Portland, Me., to Sarnia, Ont., numbering about 800, have struck for an advance of pay. The men say that they earn about 90 cents a day and demand a minimum rate of \$1.25.

The United States Express Co., of which Thomas C. Platt is President, has opened offices at the principal towns on the Hudson River between New York and Albany. It is said that business will be done on the boats on the Central Hudson Steamboat Co., a consolidation of local boat lines which was recently organized, and in which Mr. Platt is a stockholder. The express business on the railroads along the Hudson River is done by the American (on the east side) and the National (on the west).

The law lately passed in Wisconsin forbidding public officers to ride free on railroads is very stringent. A recent statement in the Milwaukee Sentinel says that "The railroad companies are taking no chances on being caught in violation of the anti-pass law. They have supplied conductors with a book of blank forms which every man who presents a pass must sign, declaring he is not a member of the Wisconsin Legislature, or other incumbent of a public office or candidate for office or member of any political committee. Whoever refuses to sign will forfeit the pass and be required to pay fare."

New York Rapid Transit.

The position of Mr. Orr as a member of the Rapid Transit Commission lapsed on his resignation of the office of President of the Chamber of Commerce. He has, however, been re-elected a member of the Commission to succeed Mr. John Claflin, and he has also been re-elected President of the Board.

The "Locomotive Superintendent."

The appointment of W. C. Hayes as Locomotive Superintendent of the Baltimore & Ohio will be followed by a distinct change in the plan of overseeing locomotives in service. The positions of "Super-visors of Engines and Trains" have been abolished and traveling engineers substituted, who will report to the new official at Mt. Clare, Baltimore. The road has been divided into the following subdivisions and a traveling engineer appointed for each: Philadelphia to Washington; Baltimore to Brunswick; Brunswick to Cumberland; Cumberland to Grafton; Grafton to Benwood and Parkersburg; Pittsburgh to Cumberland and Wheeling; Wheeling to Sandusky and branches; Chicago to Akron.

Bridges for Foreign Orders.

The Phoenix Bridge Company has received a contract from the Japanese Government, through the American agents in New York, to build a large steel bridge for the Imperial Railway of Japan. The bridge will be in six spans, 130 ft. high at the maximum elevation. The bridge will be ready to ship by Sept. 1.

The last parts of the Athara bridge have left Alexandria, and will arrive at Athara in about three weeks. It is believed that erection can be completed before the floods.

Chicago Notes.

The Illinois State Commission, appointed to inspect the Drainage Canal, as noted in our issue of last week, organized at Chicago May 16. Mr. Isaac Taylor was chosen Chairman of the Commission, and Mr. Albert H. Schoch, Secretary. The offices of the Commission will be on the eighth floor of the Security Building, corner of Fifth Ave. and Madison St. The next meeting will be held May 26, when it is expected that an engineer will be selected and active work begun.

The Council Committee on Harbors, Viaducts and Bridges has recommended an ordinance requiring boats over 200 ft. long to be towed by tugs if they go up the Chicago River beyond the first bridge, which is at Rush St., and fixing the limits of towing

at Twelfth St. on the South Branch and Halsted St. on the North Branch. On May 17 another large steamer loaded with grain in trying to get down the river without a tug was stuck on the La Salle St. tunnel for an hour. It is estimated that a Chicago river bridge is swung on an average 30 to 35 times a day, with a maximum of 45 times in the busiest part of the season.

The Lake Street Elevated on May 16 began running every other train during the rush hours through to Wisconsin Ave., Oak Park. This change gives better service than called for by the ordinance, but is demanded by the increasing business of the road from Oak Park.

Storage Battery Traction.

As noted in our issue of May 12, page 344, the Chicago Electric Traction Co., the storage battery road, which has been operating between Sixty-third St. and Blue Island (132d St.), is building an extension to Harvey, running south to about 160th St., 3½ miles, and east about 1½ miles to Harvey. All of this extension is single track, 80-lb. 7-in. girder rails being used for 4 miles, and 70-lb. T-rails for 1 mile. Servis tieplates are used. As the new terminal at Harvey will be 13 miles from the power house at Eighty-eighth St. and the ordinary trip of 26 miles is more than the batteries should make in regular service, the company is building a power house at Harvey, where the batteries can be partly charged. The building is of brick 26 ft. x 70 ft., one story high, and is equipped with one Nash gas engine of 50 h. p., using gasoline as fuel; one 40 k.w. Eddy generator and a secondary battery of 95 400-ampere hour cells. The station is designed to charge four large batteries at one time and will be ready for operation June 1. A new car house is also being built at the Eighty-eighth St. station which will be 100 ft. x 160 ft. of iron and steel construction and to accommodate 50 cars.

Hardie Motor in Chicago.

As noted last week, a Hardie compressed air motor is being tried at Chicago with a view to putting these cars into night service on the cable roads in place of the horse cars. The rights for the States of Illinois and Wisconsin under the Hardie patents are owned by the Compressed Air Motor Co., of Illinois, with principal offices in the Monadnock Building. The American Air Power Co., of New York, is a stockholder in the Chicago company and supplies apparatus for the test. The test of the car on May 13 was satisfactory, the trip took 25 minutes against 40 minutes for the horse cars. At the North Clark St. power house a compressing plant is being built by the Fraser & Chalmers Co. and the intention is to put the car into regular service. It is 28 ft. long with side seats and weighs 18,200 lbs. For the experimental trips it has been charged to run 10 miles, but, it is claimed, it can be charged to run 25 miles and haul a trailer. The officers of the Compressed Air Motor Co. are: President, H. D. Cooke; Treasurer, A. C. Soper, and Robert Hardie, Engineer.

Lake Notes.

At Waukegan, Ill., the 60-ft wide channel and basin 120 ft. wide have been dredged to a depth of nearly 20 ft. by the city.

The Milwaukee Dry Dock Co. has paid the Goodrich Transportation Co. \$10,915 in settlement of the judgment for damages to the steamer Muskegon, which dropped 2 ft. while in dock in September, 1896, and was seriously damaged. A pending appeal to the Supreme Court has been dropped.

A raft of 500,000 ft. of hemlock logs which was towed to Menominee, Mich., broke up on May 16 and a large proportion of the logs were lost.

Center Pier Bridges at Chicago.

Acting on the recommendation of Major W. L. Marshall, U. S. A. Engineer at Chicago, the Secretary of War has refused the permission requested by the Chicago City authorities to set up at Throop St. the center pier bridge recently removed from Taylor St. Major Marshall is of the opinion that "the bridge would be a nuisance anywhere in the Chicago River within five miles from its mouth," and advises that no more center pier bridges be authorized. Major Marshall says: "Congress has begun the improvement of the Chicago River, and it is recognized by all that the removal of center piers from the channel is the necessary improvement to be made, without which the Chicago River cannot be navigable for modern vessels at cost not prohibitory."

They must all be removed, at which time such bridges only as are adapted to the requirements of commerce here should be allowed to be built within five miles of the mouth of the river." In this recommendation the Chief of Engineers concurs. Commissioner of Public Works McGann, of Chicago, has asked permission to sell this bridge for what it will bring as old iron.

The Man Who Killed Wattson.

It will be remembered that Mr. W. G. Wattson, Superintendent of the West Shore RR., was shot and killed in his office in Weehawken something more than three years ago. The murderer, Edward Clifford, is still alive and an effort has been made to prove his insanity. The case has lately been up in the Court of Oyer and Terminer, in New Jersey, and the defense attempted to establish parietic dementia. It is probable that they made out their case, but the judge decides that while the prisoner is suffering from grave disease, which may or may not indicate an early termination of his life, and which may or may not indicate entire decay of his mind, yet the evidence does not show that the prisoner does not now realize the situation in which he is placed, and he was sentenced to be hanged Tuesday, June 27. The prisoner's counsel announced his intention of applying for a writ to have the insanity proceedings reviewed by the Supreme Court.

Supreme Court Decisions.

The United States Supreme Court has adjourned for the term. During the session the Court disposed of 519 cases, leaving 302 on the docket. At the close of the last previous term the docket contained 313 cases.

The decision of the Supreme Court of New Mexico in the case of the Rio Grande Dam and Irrigation Company, which was favorable to the company, was reversed by an opinion handed down by Justice Brewer. The case originated in a bill by the United States to restrain the company from constructing a dam across the Rio Grande in New Mexico that would interfere with navigation.

In the case of the city of Richmond, Va., against the Southern Bell Telephone and Telegraph Company, involving the right of the company to locate its poles and wires in the streets of the city, re-

gardless of the protest of the municipal authorities, the decision was favorable to the city.

An opinion was handed down by Justice Peckham in the case of the Northern Pacific Railway against James De Lacey, involving title to 160 acres of land near Tacoma, and also incidentally to a considerable number of claims on the line of the Northern Pacific. It was held that the land came within the grant to the railroad company.

The court held, in the case of the Missouri, Kansas & Texas Railroad against McCann & Swizer, that a railroad company receiving a consignment of goods was responsible for damage to them in cases where the damage occurred on a connecting line.

The court decided the case of the Louisville Trust Company against the Louisville, New-Albany & Chicago Railway and others, involving the contention over the guarantee given by the L. N. A. & C. on the bonds of the Richmond, Nicholasville, Irvine & Beattyville, amounting to \$1,185,000. This guarantee the New-Albany road sought to have declared void, and much litigation ensued. The opinion was prepared by Justice Brewer. The decision in favor of the railroad company in the Court of Appeals for the VIIIth Circuit was reversed.

Some Canal Matters.

The supposition was that the report of the Nicaragua Canal Commission would be submitted to the President on Tuesday of this week.

We wrote the other day a brief obituary of the Cape Cod Ship Canal. It appears now that the bill granting a charter to the Boston, Cape Cod & New York Canal Co. has been revived in the Massachusetts State Senate and passed to its third reading; so after all this venerable project may take on new life.

The Emperor William is very anxious for a "Midland Canal" across Germany, but the committee of the Reichstag has rejected the bill. The correspondent of the Associated Press, however, says that this does not mean its defeat, for the Emperor intends to use his personal influence to have it passed. He regards it as a military necessity. Probably the Associated Press man pulls with the Kaiser.

Public Works Projects in England.

The United States has not a monopoly of grand schemes. The Board of Trade report on public works bills, introduced at the session of Parliament of 1899, says that the total bills deposited relating to railroads, canals, tramways, gas, electricity and water in the session of 1899 amounted in number to 214, as compared with 197 in the session of 1898. The total amount of money proposed to be raised was about \$478,000,000, which was an increase of about \$212,000,000 over the preceding years. The bills relating to railroads and canals alone amounted to 79 in number with an aggregate proposed capital of \$207,000,000.

Car Fenders.

The work of equipping the grip cars of the Chicago City Railway with fenders is now completed, and a large number of cases brought by the city against the road for violation of the fender ordinance have been disposed of by having judgments for costs entered against the company. The fenders used by this road are similar to those used on the cars of the other Chicago lines, except that the front line of the fender is further from the ground.

Crerar Library, Chicago.

The fourth annual report of the Crerar Library was issued at Chicago, April 22, and shows an increase in assets and annual income. Fully \$3,000,000 is now available for the endowment fund, while a surplus of \$35,000 from operating account is applicable to the building fund, which will amount to about \$192,000. The Committee on Buildings and Grounds has arranged for additional space, which will soon be needed. During the year 14,000 volumes have been added to the Library, making a total of 43,000 volumes. Nearly 70,000 volumes and periodicals have been actually used during the year, the increase being about 55 per cent. This increase has been well distributed through all departments of the Library. More than 30,000 persons visited the Library during the year, an average of 99 a day.

An Automobile Repair Wagon.

The Consolidated Traction Company, Pittsburgh, Pa., is about to add to its equipment in Pittsburgh an automobile emergency wagon for use on its lines, particularly on the streets in the East end. It has been built by the Pope Mfg. Co. The new wagon will have a storage battery that will give it a mileage of not less than 15 miles at an average speed of 10 miles per hour on ordinary city streets where the average grade does not exceed 1%, and where the maximum grades does not exceed 10%.

Havana Street Railroads.

Mr. G. F. Greenwood, formerly Chief Engineer and now Consulting Engineer of the Consolidated Traction Company, Pittsburgh, Pa., has been appointed Engineer in charge of rebuilding the street railroads in Havana. There are at present about 25 miles of track in that city. The New York and Canadian syndicate, which has obtained control, proposes to begin work in the fall on rebuilding and extending the present roads.

Eight Street Cars in a Collision.

By a collision between two West Side cable trains, a train on the Wentworth avenue electric line and an express wagon at the corner of Clark and Adams streets, Chicago, on the morning of May 22, eight cars were badly wrecked. A cable train of three cars had stopped for a crossing, when a broken strand of the cable became tangled in the grip of a three-car train following behind. This train became unmanageable and ran into the train ahead, telescoping several cars and pushing the first train into a Wentworth avenue train, which was crossing Adams street, throwing it from the track and striking a passing express wagon. Very few passengers were in the cars at the time, and all were saved by jumping.

New York Tunnels.

Certificates of incorporation have been filed at Albany by the Manhattan Tunnel Railway Co., which proposes to build a tunnel under the Hudson River. This company is not interested in the unfinished Hudson River tunnel, which is to be sold soon under foreclosure proceedings. The new company proposes to build a tunnel for freight and passenger service between Jersey City and New York. The incorporators are William E. Knight, Arthur P. Knight, F. M. Lande, Charles S. Bradley, W. A. Courtland, J. P. Laflin and D. J. Newland, of New York; James

W. Halse, of Brooklyn; P. W. Hall, of Cranford, N. J.; C. R. Burke, Claremont, N. J., and W. M. Grosvenor, Jr., of Englewood, N. J. The company has been incorporated with a capital of \$10,000, with privilege to increase to an unlimited amount.

The New York & Brooklyn Railroad Co. has sought to obtain a franchise from the New York Municipal Commission to build a tunnel under the East River connecting New York and Brooklyn. Little seems to be known in regard to the plans of this company or the names of those interested. It was stated, however, that should a franchise be granted, this company would in no way interfere with the plans of the Brooklyn, New York & Jersey City Terminal Ry. Co., which is a subordinate company of the Long Island Railroad, which will build a tunnel from the Long Island Railroad station at Flatbush avenue, Brooklyn, to New York, with stations at Pearl and Cortlandt streets. This latter company has not, however, asked for a franchise, its plans not having been perfected.

Still another East River tunnel scheme is that of the New York & Brooklyn Tunnel Co.

LOCOMOTIVE BUILDING.

It is reported that the Mexican Central has prepared specifications for some new consolidation locomotives.

We understand that the locomotives in which the Indiana, Illinois & Iowa will get bids will be 10-wheel freight engines.

Cable despatches announce that an order has been given to the Baldwin Locomotive Works for a locomotive for use in Palestine.

The Port Angeles Eastern, a road now building, is in the market for locomotives. Isaac C. Atkinson, of Port Angeles, Wash., is Vice-President and General Manager.

We understand that the order for six engines placed with the Schenectady Locomotive Works by the Interoceanic of Mexico will probably be increased to twelve.

The Baldwin Locomotive Works has now received the order for the 20 locomotives for the Great Central, of England, mentioned in our issue of May 12. They will be for freight service and substantially similar to those being built for the Midland and Great Northern roads of England, by the Baldwin Locomotive Works.

CAR BUILDING.

It is stated that the Philadelphia & Reading will build at its shops during the summer 100 cabooses.

The Pennsylvania Company will build at its Fort Wayne shops 24 stock cars.

The Southern Indiana has placed an order with the Barney & Smith Car Co. for 250 freight cars.

The Chicago Great Western has ordered seven cabooses from the American Car & Foundry Co.

The Atlantic, Valdosta & Western has ordered three cars for passenger service from the Jackson & Sharp Co.

The American Car & Foundry Co. has received an order to build 200 cars for the Michigan Alkali Co. They will be built at Detroit.

We understand that the Grand Trunk will build cars needed for immediate use and will not order outside on account of high prices.

We understand that the Mexican Central has prepared drawings for new stock, box, coal and flat cars and first and third-class passenger cars.

The Port Angeles Eastern, now building, Isaac C. Atkinson, Vice-President and General Manager, Port Angeles, Wash., is negotiating for rolling stock.

The Great Northern has issued specifications and is getting bids on from 200 to 400 steel coal and ore cars of 80,000 lbs. capacity, for which orders will be placed probably in about ten days. The design for these cars was prepared by Mr. Max Tolz, Bridge Engineer of the road, and they are to be built of channels and angles.

The Lehigh Valley has just ordered 400 box cars of 80,000 lbs. capacity from the American Car & Foundry Co. They will weigh about 34,000 lbs. and measure 34 ft. long, 8 ft. 2 in. wide, and 7 ft. 4 in. high, inside, and be equipped with Schoen-Fox pressed steel bolsters, Sterlingworth brake beams, Westinghouse brakes, Tower couplers, Graham draft rigging, malleable iron journal boxes with pressed steel lids, Fox trucks and 33 in. chilled cast iron wheels.

The Elizabeth (N. J.) Street Railway, about to be charged from horse to electric and extended, will need 10 open and 10 closed motor cars. Bids are now being received.

BRIDGE BUILDING.

ADRIAN, MICH.—The House has passed a bill authorizing Palmyra Township to build a bridge over Raisin River, at a probable cost of \$7,000.

ALBANY, N. Y.—Superintendent of Public Works, J. N. Partridge, has let contracts for bridge work as follows: For a lift bridge at Canastota, to the Havana Bridge Works, for \$15,693. For repairing the bridge at the foot of Liberty St., Penn Yan, to William I. Marson, of Geneva, \$1,182. For completing the bridge over the inlet to Otsego Lake, Onondaga County, to Gillette, Hay & Gillette, of Rochester, for \$6,943. For building a bridge over the Erie Canal or Tonawanda Creek, between Pendleton and Picketts Bridge, to the Hilton Bridge Co., for \$10,641.

AMSTERDAM, N. Y.—Superintendent E. Van Etten of the New York Central & Hudson River, has submitted plans to the Mayor of Amsterdam for the proposed overhead bridge at Railroad St., and for the subway from Railroad St. to the station at Amsterdam. The estimated cost of the overhead bridge is \$2,000, and of the subway, \$5,200.

ARLINGTON, IND.—One of the improvements to be made this year by the Cincinnati, Hamilton & Dayton, it is said, is a new bridge near Arlington. The present structure is a trestle 300 ft. long and 35 ft. high.

BALTIMORE, MD.—The Baltimore & Ohio may build a new bridge across the Monocacy River, Md. (See RR. Construction column.)

BILOXI, MISS.—The city proposes to issue \$40,000 bonds, \$15,000 of which will be used for a bridge across Back Bay.

BIRMINGHAM, O.—Following are the bids received for the superstructure of a bridge across the Vermillion River, which were opened by J. C. Hauser, County Commissioner, May 9: The bids for bridge with wood floor are marked, (1), those including paved roadway, (2). Massillon Bridge Co., Massillon, O., (1) \$13,275; (2), \$19,875. Toledo Bridge Co., Toledo, (1), \$10,750; (2), \$21,500. Canton Bridge Co., Canton, O., (1), \$12,500; (2), \$16,000. Brackett Bridge Co., Cincinnati, (1), \$10,600. Wrought Iron Bridge Co., Canton, O., (1), \$10,650; (2), \$12,400. Iron Substructure Co., Columbus, (1), \$12,780; (2), \$8,375. Variety Iron Works, Cleveland, (1), \$14,078; (2), \$20,815. Groton Bridge Co., Groton, N. Y., (1), \$14,891. Youngstown Bridge Co., Youngstown, O., (1), \$10,648; (2), \$17,332. King Bridge Co., Cleveland, (1), \$12,200; (2), \$16,400. Lafayette Bridge Co., Cincinnati, (1), \$12,500. Mt. Vernon Bridge Co., Mt. Vernon, O., (1), \$11,000; (2), \$14,200. Oregonia Bridge Co., Lebanon, O., (1), \$17,850 for Melan Arch bridge.

The bids for the masonry abutments and piers were also opened; they were: Rikeman & Croft, Milan, O., \$3,300. J. O. Parker, Sand Hill, O., \$2,950. Truitt & Britton, Milan, O., \$2,243. E. B. Page, Birmingham, O., \$2,801. Garland & Robertson, Birmingham, \$3,367.

BROOKINGS, S. D.—According to report, June 1 is the date set for receiving the bids for the combination steel bridges to be built at this place. L. H. Storgaard, County Auditor.

BUFFALO, N. Y.—The following bids were opened May 16 by the Grade Crossing Commission for building a viaduct at Seneca and Hamburg Sts., over the tracks of the Nickel Plate. Two propositions were submitted to bidders. The first had reference to guaranteeing the repair of pavements for a term of 10 years, or not; the second had reference to doing the work according to the provisions of the State labor laws and City Ordinances. The bids for the superstructure were as follows:

Toledo Bridge Works, first proposition, \$124,461 and \$123,781; second proposition, \$123,622 and \$122,982. King Bridge Works, \$141,840 for each of the propositions. Elmira Bridge Company, first, \$121,483; second, \$120,875. Edgemoor Bridge Company, first, \$133,959 and \$133,311; second, \$130,861 and \$130,213. Buffalo Bridge & Iron Works, \$125,430 for all the propositions. Penn Bridge Company, \$113,390 for all the propositions.

The bids received were as follows for the superstructure:

Charles Mosier, \$70,173.43; Christopher Smith, \$69,959.50; Dwyer & Huntington, \$69,315.79; Rumrill & Carter, \$69,857.01; Brown, Stabell & Griffiths, \$69,198.59; Frank J. Read, \$68,669.26.

COHOES, N. Y.—The Governor has signed the bill appropriating \$5,000 for a suitable bridge over the Chamberlain Canal at Ontario St., Cohoes, and for the removal of the present bridge.

DENVER, COLO.—Addison J. McCune, State Engineer, wants, by June 5, plans and specifications for a bridge to be built across Clear Creek at Big Bar, two miles from the town of Idaho Springs.

Sealed proposals will also be received by the State Engineer until 12 o'clock noon, June 5, for building a wooden bridge, or a combination wood and iron bridge, across Grand River at Hot Sulphur Springs, Grand County. The bridge is to have one span of 60 ft., and two spans of 40 ft. each, with a roadway of 14 ft. in the clear, and have a capacity of not less than 1,000 lbs. per lineal foot.

DES MOINES, IA.—The City Council has decided to build a Melan Arch bridge across the Des Moines River on North Sixth St. The plans contemplate a structure 370 ft. long, and estimate the cost at \$90,000.

ELKHORN, ORE.—According to report, the County Commissioners will receive bids June 7 for a bridge over Santiam River.

FULLERTON, NEB.—Bids are wanted June 16 for a steel bridge about 60 ft. long, by D. W. Ellsworth, County Clerk, Nance County.

GALLATIN, MO.—Bids are wanted June 5, according to report, by George W. Lockridge, for a steel bridge across Grand River.

GIBSON, GA.—B. F. Walker, County Clerk, may be addressed regarding bids to be received June 6 for a new bridge.

GRAND RAPIDS, MICH.—The steel bridge which is proposed at Bridge St. will be about 550 ft. long. (Jan. 13, p. 31.) D. W. Hunter may be addressed.

HOT SPRINGS, ARK.—Bids are wanted June 1 for the steel bridge of four spans to be built at Gardner's Ferry, near Hot Springs, by S. P. Van Tatten, Chairman, County Bridge Committee, 316 Prospect Ave. (May 12, p. 342.)

HUTCHINSON ISLAND, GA.—A. Hunter Johnson, Chief Engineer of the Georgia Construction Co., will receive bids until 10 a. m., May 29, for building trestles and superstructure of the bridge across the Savannah River from Meridian to Hutchinson Island, for the Georgia & Alabama Ry. (Jan. 27, p. 70.)

INDIANAPOLIS, IND.—The Wrought Iron Bridge Co. has the contract for building a temporary bridge for the Indianapolis St. Ry. Co. over Fall Creek at Central Ave., to replace the structure recently destroyed. City Engineer Jeup reports that the following bridges are weak and should either be repaired or rebuilt: Meridian St., Capital Ave., Northwestern Ave., Indiana Ave., Washington St., and perhaps Morris St., and West Michigan St.

JACKSON, MISS.—The Virginia Bridge & Iron Co. has secured a contract from the Supervisors of Franklin County for two bridges over the Homochitto River, one to cost \$16,000 and the other \$17,200.

KESWICK, CAL.—The Supervisors of Shasta County have granted a petition for the new bridge across the Sacramento River at Keswick Station. A. J. Dryman, County Clerk.

LA PORTE, IND.—The County Commissioners, on May 12, opened the following bids for the Shumaker

and Stoll bridges (each 16 ft. span), in Springfield Township, the Timm bridge (24 ft. span), in Coolspring Township, the Heckman culvert in Galena Township and the Wolf culvert in Coolspring Township: Lafayette Bridge & Iron Company, \$3,665; J. B. Lindahl, Chester, \$2,739.25; Aug. Schweizer, Michigan City, \$2,785.70; Belefontaine Bridge Company, \$3,097. John Danielson, La Porte, stone arches and culvert, \$2,568; brick arches and culvert, \$2,388.*

* Awarded.

LE ROY, N. Y.—The Wrought Iron Bridge Company of Canton, O., has sold two 100-ft. bridges to the Buffalo, Rochester & Pittsburgh RR. for \$4,060. One is for Haskins Crossing in Le Roy and the other will be built at Gainesville. (March 3, p. 159.)

LEWISTON, IDA.—Ernest McCullough, according to report, will apply to the commissioners of Nez Perce County shortly for permission to build a public toll bridge across the Clearwater River at Lewiston.

LODI, WIS.—An iron bridge, according to report, will be built at Main St.

M'MINNVILLE, ORE.—The Commissioners of Yamhill County have authorized the Clerk to advertise for bids to build a bridge in District 22, known as Sanders' Bridge; also for building a span for Willamina bridge, known as Parker's Bridge; also for building a bridge across North Yamhill River near Carlton, in Districts 13 and 23.

A bridge about 105 ft. long was ordered built on the county road leading from Lafayette to West Chehalis. G. F. Earhart was appointed to superintend its construction.

A bridge was also ordered built on county road two miles east of Newberg, as per plans furnished by D. I. Pearce, who was appointed to superintend the work.

MEDFORD, ORE.—The County Judge will receive bids, June 7, for a covered bridge over Antelope Creek on Eagle Point and Medford road.

MONTREAL, QUE.—The report that the Grand Trunk Ry. proposes to rebuild a bridge across the Niagara River between Fort Erie, in Canada, and Black Rock, near Buffalo, N. Y., is officially denied. A new bridge will replace the old tubular structure at St. Anneson.

ONEIDA, N. Y.—The Town Boards of Oneida and Vernon are considering the advisability of changing the grade crossing of the Ontario & Western RR. at the Castle into an overhead crossing.

OTTAWA, ONT.—The New York & Ottawa Bridge Co. has given a mortgage to the New Jersey Register & Trust Co. for \$500,000.

PITTSBURGH, PA.—The County Commissioners have awarded contracts to the Pittsburgh Bridge Co. for the superstructure for the 13 through plate-girder iron bridges at \$18,995 for all. The contract for the masonry on the new bridges and culvert work has been awarded to Wm. Dixon, for four bridges; C. M. Driver, nine; Jas. Kimberlin, two, and Andrilles Anchorani, two. (May 12, p. 342.)

PLYMOUTH, IND.—Frederick Seidler, Chairman of the County Commissioners will receive bids until June 8 for building a bridge over Pine Creek.

POINT TOWNSEND, WASH.—The Board of Commissioners of Jefferson County, will receive bids June 5 for repairs to bridges. M. M. Smith, County Auditor.

ST. LOUIS, MO.—The St. Louis & San Francisco RR. Co., according to report, proposes to replace many wooden bridges along the line with steel structures.

SANDY HILL, N. Y.—Monty, Higley & Barber of Sandy Hill, according to report, have been awarded a contract for a steel bridge in Sandy Hill.

SAN JOSE, CAL.—The City Engineer has submitted a report to the Council suggesting rebuilding the Julian St. bridge, which has been closed to traffic, crossing the Coyote River. The total length is 190 ft., with a 90 ft. span.

Supervisor Roll reported that the bridge near Almaden is in an unsafe condition and should be rebuilt.

SANTA CRUZ, CAL.—Supervisor N. Mosher's plans and specifications for the Burnett bridge, near Corralitos, have been adopted and H. H. Miller, Clerk to the Board of Supervisors, authorized to advertise for bids.

SEATTLE, WASH.—Sealed bids will be received by the Board of County Commissioners of King County June 16 for furnishing material and building a steel bridge with a 225 ft. span, over Snoqualmie River, at Novelty, with the approaches and bank protection. E. H. Evenson, Clerk of Board of Commission.

SYRACUSE, N. Y.—Proposals will be received until May 29 for furnishing material and building a steel girder bridge over the Onondaga Creek at its intersection with West Fayette St. A certified check for \$500, payable to City Treasurer E. Fallin, is required with bids. George J. Metz, City Clerk; R. R. Stuart, City Engineer. Much opposition is still being shown against the new bridge across the same creek at Rich St. (May 3, p. 159.)

TIVERTON, R. I.—The Secretary of War has approved the plans for the new drawbridge over the Seakonnet River, to be built by the New York, New Haven & Hartford.

TOWANDA, PA.—David A. Keefe, Designing Engineer, Athens, Pa., will receive bids until June 1, for a bridge 90 ft. long; another, 62.5 ft. long, and a deck beam bridge of about 22 ft. long.

Mr. Keefe will also receive bids on June 2 for a steel highway bridge 44 x 12, at Wyalsburg, Pa.

VELASCO, TEX.—The Surf Side railroad, according to report, will build a drawbridge on the Boulevard.

VICTORIA, TEX.—The County Commissioners of Victoria and Refugio counties have decided to build an iron bridge over the San Antonio River near the Terrell place. Another bridge is contemplated over the Guadalupe River. Wm. Stuart, County Surveyor, Victoria, Tex.

WENDOVER, WYO.—The Colorado & Wyoming RR. will require one wooden bridge about 375 ft. long. (See RR. Construction column.) J. A. Keeler, Boston Building, Denver, Colo., Vice-President.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Georgia Southern & Florida.—Semi-annual, first preferred, 2½ per cent., payable May 10.
Mexican Northern.—Quarterly, one per cent., payable June 2.

British Columbia Electric.—Annual, preferred, 5 per cent.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association of General Baggage Agents.—The annual convention will be held at Charlevoix, Mich., Monday, June 19. J. E. Quick, Grand Trunk Ry., Toronto, Can., Secretary.

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Railway Master Mechanics' Association.—The thirty-second annual convention will be held at Old Point Comfort, Va., beginning Monday, June 19. John W. Cloud, Secretary, The Rookery, Chicago.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m. The annual convention will be held June 27-30, at Cape May, N. J., Stockton Hotel.

American Society of Railway Superintendents.—The annual convention will be held at Detroit, Mich., beginning Sept. 20. C. A. Hammond, Secretary, Asbury Park, N. J.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2020 State St., Chicago.

Association of American Railway Accounting Officers.—The annual convention will be held at Montreal, Can., June 28. C. G. Phillips, Secretary, Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges & Buildings.—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Roadmasters' Association.—The annual convention will be held at Toronto, Sept. 20. J. Drinkwater, Secretary, Winchester, Ont.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Eastern Maintenance of Way Association.—The annual convention will be held Aug. 16 at Portland, Me. F. C. Stowell, Ware, Mass., Secretary. Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.)—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month at 7.30 p. m.

International Association of Car Accountants.—The annual convention will be held at Saratoga, N. Y., June 20. G. S. Russell, Secretary, Cedar Rapids, Ia.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car & Locomotive Painters' Association.—The annual convention will be held Sept. 12 at Philadelphia, Pa. Robert McKeon, Secretary, Kent, O.

Master Car Builders' Association.—The thirty-third annual convention will be held commencing June 14, at Old Point Comfort, Va. John W. Cloud, Secretary, 774 The Rookery, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

National Association of Car Service Managers.—The annual meeting will be held June 19 at Niagara Falls, N. Y.

National Association of Local Freight Agents' Association.—The annual convention will be held at Norfolk, Va., June 13.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thurs-

day in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Roadmasters' Association of America.—The annual convention will be held in Detroit, Mich., Sept. 12. J. B. Dickson, Secretary, Sterling, Ill.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms, in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Train Dispatchers' Association of America.—The annual convention will be held at Milwaukee, Wis., June 20. John F. Mackie, Secretary, Chicago.

Traveling Engineers' Association.—The annual convention will be held in Cincinnati, O., Sept. 12. W. O. Thompson, Secretary, Elkhart, Ind.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

American Institute of Electrical Engineers.

As reported last week the sixteenth annual meeting of the Institute was held at 12 West 31st street on Tuesday, May 16. The Treasurer reported that all the debts had been paid and that the cash balance amounted to \$5,702.74. The following officers have been elected for the ensuing year: President, Dr. A. E. Kennelly; Vice-Presidents, Messrs. J. W. Lieb, Jr., Charles F. Scott and L. B. Stillwell; Managers, Messrs. C. O. Malloux, S. Dana Greene, C. S. Bradley and W. D. Weaver; Secretary, R. W. Pope; Treasurer, George A. Hamilton. At a meeting of the Executive Committee in the afternoon 20 associate members were elected and two associate members were transferred to regular membership. The general meeting of the Society will be held at Boston, June 26-28.

Western Society of Engineers.

Mr. T. W. Snow presented a paper entitled, "Wood vs. Steel Tanks for Water Stations," at a meeting of the Society, Wednesday evening, May 17. Mr. Snow showed that steel tanks of the sizes usually used cost considerably more than wooden tanks, in metal tanks the water was more liable to freeze in cold weather, and there was the further disadvantage of the steel deteriorating by corrosion. Wooden tanks, if made of good material, should last between 20 and 30 years, but it was becoming more and more difficult to secure the proper stock for tanks. The discussion was principally along the lines of securing a suitable coating for the inside of steel tanks that would protect the metal from rust. Pure asphalt was thought to offer the most advantages, and Mr. Findley, Bridge Engineer of the Chicago & Northwestern, stated that he had found asphalt to be an excellent protection for metal floors of bridges, and that asphalt could be applied to vertical surfaces.

Trans-Mississippi Congress.

The tenth session of the Trans-Mississippi Commercial Congress is to be held at Wichita, Kan., four days, beginning May 31. The speakers assigned to the various subjects are men who have made a special study of these problems. Among the subjects announced for discussion are the following:

1. Irrigation and the Arid Regions: Should Congress Legislate? What can be done by individual effort?
2. Improvement of western rivers: (a) Floods of the Mississippi; (b) Deep water at the mouth of the Mississippi; (c) Preservation of the forests.
3. Water Transportation: Nicaragua Canal, harbors on the Pacific coast, Gulf outlet.
4. Transportation Facilities: 5. How to increase trade with Mexico, Japan, China, etc. 6. Mining: A National department of mines. 7. Agriculture: (a) beet sugar; (b) introduction of Indian corn in Europe as a culinary article. 8. National quarantine. . . . 15. Our representation at the Louisiana Purchase Celebration and the Paris Exposition.

Western Railway Club.

A meeting of the Western Railway Club was held Tuesday afternoon, May 16, at the Auditorium Hotel, Chicago. This being the last meeting of the year, the Secretary presented a report, showing that during that time 11 papers were read and discussed at meetings, 10 topics were discussed and 2 reports were made by committees. The names of 130 new members were added to the rolls, 65 were suspended for failure to pay dues, 39 withdrew and 6 members died, making a net increase of 20 members. The present membership of the Club is now 906, claimed to be larger than that of any other railroad club. The Treasurer's report showed that the balance on hand last year was \$1,052.62, and this year \$1,875.19. This year the receipts increased \$1,816.88, and the disbursements \$1,030.41.

Mr. C. H. Quereau, Master Mechanic of the Denver & Rio Grande, presented a paper, "Notes on Hot Main Pins," describing a method of fitting the brasses of the main crank pins of high speed locomotives, which was considered better than that commonly used. Messrs. F. A. Delano and R. D. Smith, of the Chicago, Burlington & Quincy, took exceptions to the method advocated by the paper and claimed it was unreasonable to expect any improvement by its use; that the good results obtained by Mr. Quereau were probably due to causes other than this method of fitting the brasses.

In the result of the election of officers for next year, which was announced in our last issue, several names were incorrectly reported. The officers elected were: President, H. G. Hetzler; Vice-President, A. E. Manchester; Second Vice-President, W. F. M. Goss; Treasurer, Peter H. Peck. The two new Directors are R. D. Smith and B. Haskell.

The Board of Directors on May 16 re-elected Mr. F. M. Whyte Secretary of the club for the ensuing year.

Engineers' Club of St. Louis.

The Club met May 3, 1899, at 8.20 p. m., with Vice-President Nipher in the chair. Sixteen members and one visitor were present.

Mr. Pitzman addressed the Club in regard to subscribing to the World's Fair Fund. He said that he had been requested by the Finance Committee of the St. Louis World's Fair to take the necessary steps to secure stock subscriptions from the engineers and surveyors of the city to the capital stock of the corporation to be organized under the act of Legislature for the purpose of celebrating the Centennial Anniversary of the Louisiana Purchase; and as he thought the great historical event of the Louisiana Purchase should be celebrated in a manner commensurate with the importance of St. Louis, the largest city in the Louisiana Purchase, and as the holding of an Exposition will give great opportunities to the engineers and greatly benefit their profession, he moved that the Chairman be authorized to appoint a committee of three, to solicit subscriptions from the members of the Club. The motion was carried, and the Chairman appointed as members of the committee, Julius Pitzman, W. H. Bryan and E. R. Fish.

Mr. John A. Laird described the hydraulic system that will be used for moving the gate valves at the Baden Station. The system is now in use for moving the valves already in place. When the station is completed, there will be eight 36-in. and four 30-in. valves, each of which will be moved by a piston worked by hydraulic pressure in a cylinder. Oil is used as the medium for transmitting the pressure, and it is circulated by a small direct acting steam pump. In order to save space and piping, it was decided to adopt a one-pipe system, in which one pipe acts for both pressure and exhaust. There are about 600 ft. of $\frac{3}{4}$ -in. pipe in the system, and the pressure required to circulate the oil through the entire length varies from 25 to 50 lbs. per square inch, depending upon the temperature. It sometimes takes 100 lbs. pressure to start a valve, and after being started 30 to 40 lbs. to lift it. The valves require no pressure to close them; but 30 lbs. is put on to seat them. It is impossible to drop a valve, as the friction of the oil in the $\frac{3}{4}$ -in. pipe will only let it settle down slowly. No governor is used on the pump. Stereopticon views were shown of the general arrangement of pump and cylinders for moving the valves and cylinders, and several of the different valves in place.

The Secretary read an abstract of a paper by Messrs. John F. Wixford and S. B. Russell on "Chemical Tests of Cement."

Professor Nipher made a few remarks on gravitation in cosmical masses of gas.

PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. Robert Gillham died at his home in Kansas City, Mo., May 19. At the time of his death Mr. Gillham was one of the Receivers of the Kansas City, Pittsburgh & Gulf, and also Chief Engineer of the Omaha, Kansas City & Eastern. He was also an important executive officer in several auxiliary companies, including the Port Arthur Dock Co. and the Elevated Railroad Co. of Kansas City, and was President of the Armourdale Foundry Co. and a member of the Park Board. He was a member of the American Society of Civil Engineers, President of the Engineers' Club of Kansas City, a member of the Society of Naval Architects and Marine Engineers and of the Institution of Civil Engineers. His death came suddenly in the middle of great and intense activity and directly as the result of overwork. He was attacked by pneumonia and appendicitis and died very soon after the attack developed. He was born in New York City, Sept. 25, 1854, and had won for himself a position of power and influence and also the respect of professional men and business men at home and abroad. Mr. Gillham was a pioneer in improving the methods of city travel in Kansas City, having been the leading spirit in building the cable and elevated railroads and the Ninth Street cable incline. His success in this work led to his employment as consulting engineer in various cities. He was consulted in the development of the street car lines of Omaha, Denver, Boston, Philadelphia, Buffalo and Washington. His most important recent achievement and the one which he regarded as his greatest triumph, was the building of the Port Arthur Ship Canal. This was carried through from beginning to end by his skill and energy as an engineer and a business man. His modesty, courtesy and ability won for him the kind opinion and the respect of all those with whom he was brought in contact.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—D. H. Rhodes has been appointed Assistant Engineer, with headquarters at Topeka, Kan.

Central of Georgia.—J. L. Whitsitt has been appointed Master Mechanic, with headquarters at Savannah, Ga., succeeding P. J. Milan, resigned. W. E. Chester has been appointed Master Mechanic, with headquarters at Columbus, Ga., succeeding Mr. Whitsitt.

Central of New Jersey.—J. S. Chambers, heretofore Master Mechanic of the Buffalo Division of the Lehigh Valley, has been appointed Division Master Mechanic, with headquarters at Elizabethport, N. J., succeeding N. E. Sprowl.

Chicago, Peoria & St. Louis.—We are officially informed that W. D. Tucker, Assistant Auditor, with headquarters at Springfield, Ill., has resigned and that office has been abolished.

Cincinnati, New Orleans & Texas Pacific.—We are officially informed that M. F. Molloy has been appointed Acting Auditor, succeeding C. H. Davis, resigned. Effective May 22.

Colorado & Wyoming.—The officers of this company, referred to in the Construction column, are: President, J. C. Osgood; Vice-President, J. A. Kebley; Secretary, D. C. Beaman; Treasurer, J. L. Jerome; Chief Engineer, W. M. Porter, all of the Boston Building, Denver, Colo.

Cumberland River & Tennessee.—At a meeting of the stockholders, held May 2, the following officers were elected: President, T. Cairns; Vice-President, D. Cutler, Jr., and Secretary and Treasurer, F. A. Heath. At the same meeting the following new Directors were elected: D. Cutler, Jr., F. A. Heath and Geo. H. Reese.

Delaware, Lackawanna & Western.—We are officially informed that O. C. Post, heretofore Auditor of the Minneapolis & St. Louis, has been appointed Auditor of the D., L. & W.

Flint & Pere Marquette.—At a meeting of the stockholders, held May 17, F. H. Prince, of Boston, was elected a Director, succeeding George Coppel, of New York, resigned.

Galveston, Harrisburg & San Antonio.—R. L. Herbert, heretofore Master Mechanic of the New York, Texas & Mexican, has been appointed Master Mechanic of the G. H. & S. A., with headquarters at El Paso, Tex., succeeding O. De Young, deceased.

Grand Trunk.—J. Wilson has been appointed Superintendent of Bridges on the Middle Division, succeeding J. A. Sheedy, of Toronto, Ont., resigned. J. R. Sharpe, Superintendent of Bridges and Buildings, has resigned.

Hanover.—J. E. Hurley, of Las Vegas, N. M., has been elected President and R. J. Palen, of Santa Fe, N. M., Assistant Secretary of this newly incorporated company. (See Railroad Construction Column, May 19, p. 359.) The Directors are: Aldace F. Walker (Chairman), Edward P. Ripley, Henry L. Waldo, J. E. Hurley, R. E. Twitchell and R. J. Palen. (See Railroad Construction Column, May 19, p. 359.)

Illinois Central.—W. H. V. Rosinz, heretofore Mechanical Engineer, has been appointed Assistant Superintendent of Machinery, with headquarters at Chicago, Ill., succeeding F. W. Brazier, resigned. C. E. Taylor has been appointed Trainmaster of the Amboy Division, with headquarters at Clinton, Ill., and G. A. Clark has been appointed Trainmaster of the St. Louis Division, with headquarters at Centralia, Ill.

Kansas City, Eldorado & Southern.—At the annual meeting of the stockholders the following Directors were elected: O. H. Picher, W. H. Picher, E. O. Bartlette, Edward Cunningham, J. B. Case, Thomas Wright and L. R. Blackmer.

Lehigh Valley.—Edwin T. James has been appointed Master Mechanic, with headquarters at Wilkesbarre, Pa., succeeding H. D. Taylor, resigned.

Mason City & Fort Dodge.—At the meeting of the stockholders the following officers were elected: President, W. C. Toomey, St. Paul, Minn.; Vice-President, Hamilton Browne, Boone, Ia., and Secretary and Treasurer, S. T. Meserve, Ft. Dodge, Ia. Mr. Toomey was also elected a Director.

Mobile & Ohio.—The following changes have been made among the officers of this company: Charles S. Clarke, heretofore Division Superintendent at Mobile, Ala., has been appointed General Superintendent; J. N. Seale, heretofore Division Superintendent at Jackson, Tenn., has been appointed Superintendent of Transportation, and C. W. Gibson has been appointed Assistant General Traffic Manager. The following Division Superintendents have been elected: Henry Fonde, Mobile, Ala.; J. D. Clark, Jackson, Tenn.; H. W. Clarke, St. Louis, Ill.; M. T. Carson has been appointed Superintendent of Motive Power; J. G. Gurganus, heretofore Master Car Builder, has been appointed Assistant Superintendent, and W. N. Jones has been appointed Assistant Superintendent of the Mobile Division. The office of General Manager has been abolished.

New York Central & Hudson River.—F. W. Brazier has been appointed Assistant Superintendent Rolling Stock, succeeding S. A. Crone, of New York, resigned. George Thompson has been appointed Division Superintendent of Motive Power of the Pennsylvania Division, his jurisdiction to extend from Lyons to Newberry Junction and Mahaffey, Pa., with headquarters at Jersey Shore, Pa.

New York, New Haven & Hartford.—We are officially informed that E. E. Cardee has been appointed Supervisor of the Naugatuck Division, with headquarters at Waterbury, Conn., succeeding S. M. Burns, resigned.

Oregon Short Line.—Alexander Millar has been appointed Comptroller and Secretary, with headquarters at New York, succeeding Chas. A. Hubbard, resigned.

Pennsylvania.—J. J. Rhoads has been appointed Supervisor, succeeding Gamble Latrobe, transferred.

Pittsburgh, Bessemer & Lake Erie.—C. L. Pash has been appointed Trainmaster, with headquarters at Albion, Pa.

Port Angeles Eastern.—The officers of this company, referred to in the Construction column, are: President, C. A. Cushing; Vice-President and General Manager, I. C. Atkinson; Treasurer, Arthur Shute; Superintendent of Construction, Wm. Martelle; Chief Engineer, E. A. Fitz Henry; Auditor, M. J. B. White; Master Mechanic, W. H. Garlock. The company's office is Port Angeles, Wash.

Santa Fe, Prescott & Phoenix.—J. H. Emmert has been appointed Assistant to President F. M. Murphy. Effective May 15.

Union Pacific.—H. E. Van Housen has been appointed Assistant Superintendent of the Middle District and that portion of the Western District from Green River to and including Granger yard and station, with headquarters at Green River, Wyoming. Effective May 15.

Union Station (Buffalo, N. Y.).—The officers of this company, referred to in the Construction column, are: President, Wm. C. Cornwell; Vice-President, W. Caryl Ely; Secretary, Lewis Stockton, all of Buffalo.

Williamsport & North Branch.—At the annual meeting held at Hughesville, Pa., May 17, the change in ownership in the road (see Railroad News Column) resulted in the following new officers: President, B. Harvey Welsh, Hughesville, Pa.; Vice-President, Horace H. Farrier, Jersey City, N. J.; Secretary and Treasurer, Henry C. Adams, New York; General Manager, S. D. Townsend, Hughesville, Pa.; Assistant to President, C. Wm. Woddrop, Hughesville, Pa.; Assistant to General Manager, Herman A. Knipe, Hughesville, Pa., and General Auditor, Chas. E. Mosser, Hughesville, Pa. The following Directors were also elected: S. D. Townsend, B. Harvey Welsh, C. Wm. Woddrop, Hughesville, Pa.; Horace H. Farrier, Jersey City, N. J.; Henry C. Adams, New York; Seth T. McCormick, Williamsport, Pa., and Jno. M. Satterfield, Buffalo, N. Y.

RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

ARKANSAS ROADS.—Surveys are reported in progress for the logging road of Sawyer & Austin, of La Crosse, Wis., to run from Pine Bluff, Ark., west about 25 miles to Sheridan. (March 3, p. 160.)

ATLANTIC, VALDOSTA & WESTERN.—A mortgage executed to the Central Trust Co., New York, for \$5,000,000, has been filed at Jacksonville, Fla. The proceeds are to be used for taking up the outstanding bonded indebtedness on the 71.1 miles completed, amounting to \$711,000; to provide for further extensions; to buy terminal property in or near Jacksonville; and also to buy additional rolling stock. The line is to be extended northwest about 75 miles to Albany, Ga. (April 21, p. 288.)

BALTIMORE & OHIO.—This company, according to report, will build a branch from Guffey Station, Pa., northeast toward Irwin, to connect with gas coal properties recently bought.

Surveys are reported in progress for a cut-off about 25 miles long from Frederick Junction, Md., east to Watersville or Woodbine. It will require a new bridge across the Monocacy River.

BISMARCK, WASHBURN & FORT BUFORD.—This company has been incorporated in North Dakota, with a capital stock of \$500,000, to build a railroad from Bismarck northwest about 220 miles through the counties of Burleigh, McLean, Ward and Williams to Fort Buford, on the western boundary line. The incorporators are: W. D. Washburn, James W. Raymond, Mart B. Coon, Chas. M. Amsden and C. C. Crane, of Minneapolis.

BUFFALO, ROCHESTER & PITTSBURGH.—The extension from Lindsey, Pa., west 60 miles to Butler has been completed as far out as Dayton, 22 miles, including the Patton tunnel. (April 14, p. 27.)

CANADIAN PACIFIC.—The grading of the Pipestone branch extension will be carried this summer as far as Cannington Manor, Man., about 40 miles from the present terminus, and rails will be laid in the fall. (May 19, p. 359.)

J. W. Stewart, Superintendent of Construction on the Robson & Midway branch, reports that track is laid to the switchback over the mountain, four miles back of Brooklyn, B. C., and some 24 miles from Robson. The work of clearing out the slides on the switchback is completed and track-laying is in progress. There are six legs on each side of the switchback, requiring about 11 miles of track. From the tunnel to Eholt Summit grading is completed, with the exception of two miles of light work near Grand Forks. Bridge building is being pushed with energy. The trestle over Pup Creek, requiring nearly 400,000 ft. of timber, was put up in eight days. The bridge over Porcupine Creek is about finished. Grading will be begun at once on two of the proposed branches to the Deadwood and Greenwood mining camps. The spur to Deadwood will be built by the main line firm of contractors, and the Greenwood camp branch will be sublet. (May 19, p. 259.)

There are now 200 men employed on the Columbia & Western branch, including 75, who are widening the gage.

CAROLINA NORTHERN.—Joseph H. Meites, Chief Engineer, is reported to have begun grading at Lumberton, N. C., on this road from Lumberton southwest 45 miles to Marion, S. C. Albert A. Sparks of Lumberton is President. (March 31, p. 235.)

CENTRAL OF PENNSYLVANIA.—This company is building about one mile of track to reach the property of the Bellefonte Furnace Co., at Bellefonte, Pa. It includes a 700-ft. bridge, and is to be completed shortly after July 1. The statement was incorrectly made last week (Pennsylvania Roads, p. 360) that the work was being done by the Bellefonte Furnace Co. (Official.)

CENTRAL ONTARIO.—This company is calling for tenders, to be sent in before June 6, for clearing, grading, fencing, timber and concrete work on bridges, and the building of a telegraph line on the proposed extension from Coe Hill, Ont., north 18½ miles, to Bancroft. (Dec. 9, 1898, p. 885.)

CHICAGO, BURLINGTON & QUINCY.—Surveys have recently been made of the line from a point on the Keokuk & Western, recently acquired, about a mile from Decatur City, Ia., to run west 11 miles to Kellerton, on the Grant City branch. The contract has been let and part of the grading completed on the cut-off from Grant City, Mo., south 15 miles to Albany, on the Kansas City branch. These two cut-offs will give another line between Des Moines and Kansas City.

This company, according to report, is considering the shortening of its tracks some four miles, below Beverly, Mo., on the line between Kansas City and St. Joseph.

CHICAGO, MILWAUKEE & ST. PAUL.—This company, according to report is making surveys for a line from St. Paul and Minneapolis north about 150 miles to Duluth and Superior. It is stated that a grade not to exceed 26 ft. to the mile has been secured.

CHOCTAW, OKLAHOMA & GULF.—The General Manager is reported as saying that track laying is going down as rapidly as possible, and that the line is completed from Wistar, I. T., to a point beyond the Arkansas line, 15 miles. The grading for the roadbed is nearly completed with the exception of a very few points along the bluffs of the Arkansas River, and the belt line around Little Rock. Construction work on the bridge across the Arkansas River at Little Rock is begun. (Feb. 24, p. 146.)

COLORADO & WYOMING.—The exact route of this line is not yet determined. It will be about 16 miles long and run from a point on the Colorado & Southern, near Wendover, Wyo., to Hartville. The survey should be completed next month, and the company will probably immediately let contracts. The maximum curves are 20°, and the maximum grades 3 per cent. The work is the average mountain work. There will be no iron nor steel bridges, and the only important bridge on the line will be one of about 375 ft., probably consisting of three 125-ft. Howe spans. The line is being built by the Colorado Fuel & Iron Co., which will supply the rails. The equipment will be rented from the Colorado & Southern. (May 19, p. 359.) Officials are given under Elections and Appointments. (Official.)

CUBAN ROADS.—John McLean, representing a New York and London Cuban association, has been

authorized to make surveys and estimates for a railroad from Havana southeast to Guynes. The United Railways of Havana already connects with the place, but by a roundabout way.

FLINT & PERE MARQUETTE.—The company is shortening the main line in Bay City, Mich., from 15th St. to Columbus Ave., to prepare for a new passenger station.

GEORGIA & ALABAMA.—Sealed proposals will be received up to May 29, at Savannah, Ga., for grading track laying, bridging, trestles and superstructure of bridge across the Savannah River from Meridian to Hutchinson Island on the proposed extension. (March 10, p. 179.)

GREAT NORTHERN.—About 1,500 men are reported grading this company's cut-off from Coon Creek, Minn., north about 50 miles, via Cambridge, to Brook Park. (March 17, p. 197.)

IDAHO NORTHERN.—Surveys are reported completed for the proposed line from Kingston, Ida., on the Oregon RR. & Navigation, to run northeast about 40 miles to Sunset Peak. John A. McQuinn, of Portland, Ore., has been elected Chief Engineer. Thomas Hart, of Weiser, Ida., is President. (Dec. 9, 1898, p. 885.)

ILLINOIS CENTRAL.—This company, according to report, will build a new line from Cherokee, Ia., southwest into Sioux City, shortening the present route by some 15 miles.

JACKSONVILLE & SOUTHWESTERN.—Grading is in progress, according to report, on the first 40 miles of this line from Cummer's Mill, near Jacksonville, Fla., to run southwest about 65 miles to Newmansville and thence to the Gulf. George W. Davis, of Jacksonville, Fla., is Chief Engineer.

KANSAS CITY, ELDORADO & SOUTHERN.—The Board of Directors at a recent meeting of the stockholders was authorized to extend this line from Walker, Mo., northwest to a Kansas City connection, and also south from Eldorado Springs. It was completed last year from Walker, Mo., south to Eldorado Springs, 13½ miles. (Dec. 16, 1898, p. 904.)

KANSAS CITY, ST. JOSEPH & OMAHA.—Surveys are begun, according to report, for this proposed line from Kansas City, Mo., north up the Mississippi River, via St. Joseph, to Omaha, Neb. J. H. Pickering, of Kansas City, is interested. (April 28, p. 305.)

KNOXVILLE & BRISTOL.—W. C. Crozier, Chief Engineer, at Knoxville, Tenn., has been authorized to prepare specifications for bids for the two extensions of this line from Blaine, Tenn., southwest 18 miles to Knoxville, and from Bean Station northeast 75 miles to Bristol. (March 17, p. 197.)

LANCASTER, MECHANICSBURG & NEW HOLLAND.—This company has been incorporated in Pennsylvania with a capital stock of \$150,000, to build a railroad from Lancaster east 12 miles, via Mechanicsburg, to New Holland, paralleling the Pennsylvania. The incorporators are: William B. Given, Columbia; Samuel R. Shipley, Philadelphia; B. J. McGrann, J. W. B. Bausman and John D. Skiles, Lancaster.

LEWISTON & BUFFALO VALLEY.—The people of Loganton, Pa., are making efforts to persuade this company to extend its line to that city. The company now owns about 25 miles of logging road running from Lewiston west toward Loganton. Monroe H. Kulp, of Shamokin, Pa., is President and General Manager.

MANISTEE & NORTHEASTERN.—A branch, according to report, is to be built from Interlocken, Mich., east about three miles to a lumber tract owned by the Buckley & Douglas Lumber Co.

MEXICAN ROADS.—Wm. Anderson, representing a syndicate of New York capitalists, has been at Monterey, Mexico, arranging to build a railroad from that city east 200 miles to Matamoros, on the Rio Grande River. The syndicate proposes to make harbor improvements at Brazos de Santiago.

MINNEAPOLIS & ST. LOUIS.—The General Manager writes that the company is not considering the building of any spur from Burnside, Ia., to Lehigh, as reported last week.

MISSOURI ROADS.—The Des Moines Land & Improvement Co., according to report, will build a railroad from Lebanon, Mo., west about 40 miles across Dallas County to Bolivar, both on the St. Louis & Southwestern. Among the stockholders of the Improvement Company are Judge O. B. Ayers, of Des Moines, Ia., and J. K. Moore, of Prairie City, Ia.

MONTANA.—Cook & Woldson, of Helena, Mont., are reported to have taken the contract for the extension from Leadboro, Mont., east about 20 miles to Martinsdale, and they expect to begin work at once. Richard A. Harlow, of Helena, is General Manager. (March 31, p. 235.)

NANAIMO-ALBERNI.—The first rails were laid on this line May 6. It connects the two towns named in the title on the Island of Vancouver, B. C. W. K. Lighten, of Nanaimo, B. C., is Secretary.

NORTHERN PACIFIC.—Surveys are reported in progress for a spur line from near Portage la Prairie, Man., north to Lake Manitoba.

NORTHWEST.—About 10 miles of grading is completed on this line from Naugle, Ore., north 53 miles to Vaughn. There is a long tunnel at Oxbow. Isaac Blake, 11 Broadway, New York, is President. (April 14, p. 272.)

NORTHWEST TERRITORY ROADS.—The Federal Government has sent Mr. O. Dwyer, of the Department of Railways and Canals, to make a preliminary survey between Edmonton and Dawson City. Several parties are out under his direction.

ONTARIO & RAINY RIVER.—Application will be made to the Legislature at its present session for an act authorizing this company to acquire the railroad property and rights of the Port Arthur, Duluth & Western, which is being built in the interest of the company. (May 19, p. 360.)

OREGON SHORT LINE.—The Diamond Coal Co., of Diamondville, Wyo., has asked this company to build a system of tracks to connect its coal mines.

PACIFIC & IDAHO NORTHERN.—Track laying is reported begun near Weiser, Ida., on this line from Weiser north about 175 miles to Lewiston. Thomas

W. Bates, Payette, Ida., and Lucius G. Wilkinson, of Weiser, are directors. (May 19, p. 360.)

PENSACOLA & NORTHWESTERN.—All surveys are made and the company begins locating this week on its line from Pensacola, Fla., north 432 miles to Memphis, Tenn. O'Brien & Sheehan, 253 Broadway, New York, have the contract. (March 3, p. 161.) S. N. Van Praag, of Pensacola, Fla., is President. (Official.)

PENNSYLVANIA.—The General Manager confirms the statement made last week that the company is building a second track from Wilcox, Pa., to Kane, but knows nothing about any cut-off on the Delaware RR. below Farnhurst, Del.

PENNSYLVANIA ROADS.—The company which proposes to build an extension to the Ligonier Valley from Ligonier, Pa., southeast seven miles, via Mechanicsburg, to Laurel Hill Mountain, is known as the Byers Lumber Co., of which Capt. W. Byers, of Williamsport, Pa., and F. H. Allen, of Buffalo, N. Y., are members. (May 5, p. 324.)

PENN YAN, LAKE KEUKA & SOUTHERN.—This company was incorporated in New York, May 19, with a capital stock of \$400,000, to build a railroad from Savona, Steuben County, on the Erie, to run northeast 35 miles to the village of Penn Yan. The Directors are: John C. Zimmerman and Frank Plaisted, of Bradford, N. Y.; Francis C. Barnes and Francis C. Barnes, Jr., of Jersey City; Henry D. Manson, New York City; Clermont C. Covert and Charles A. Cockroft, of Binghamton; Charles B. Brown, of Hartford, and Coleman Barnes, of Hoboken, N. J.

PORT ANGELES EASTERN.—The route of this proposed line is from Port Angeles, Wash., southeast via Morse Canyon, Dungeness, Sequim, Blyn, Port Discovery, Hadlock, Junction City, Quileene, Helmer, Hoodport, Skokomish and Shelton to Olympia. Preliminary survey has been made for the entire length, and locating survey from Port Angeles, 25 miles. The company is letting contracts for grading, and some of these are already completed. The contract for trestle work on the water front at Port Angeles has been let to the Van Norman Bridge Co. Work is under way. J. D. McQueen and Kirk Baxter have contracts for clearing and grading. There are about 200 men at work surveying, grading, pile driving, etc. The maximum grade is about 2 per cent. The work is not difficult. There will be no iron or steel bridges. The company will require about 111 miles of rails and is negotiating with Eastern firms for the same. (May 31, p. 236.) The officers are given under Elections and Appointments. (Official.)

RUTLAND & NOYAN.—Mr. D'Arcy Scott, of Montreal, Que., solicitor for Percival W. Clement, Henry G. Smith of Rutland, and Frederick H. Button of Middlebury, Vt., has given notice that application will be made to the Canadian Parliament at the present session for an act incorporating this company to build or acquire a railroad from Noyan, Que., to the International boundary. The Canada Atlantic already has a line from that point south to Alburgh, Vt. The men making the application are connected with the Rutland RR., which is building a connecting line.

ST. LOUIS & SAN FRANCISCO.—Surveys are reported in progress in the vicinity of Tecumseh, Okla., for an extension of the St. Louis & Oklahoma branch from Stroud southwest about 60 miles to Burnett.

The company, according to report, is expending \$500,000 in improving its roadbed between Kansas City, Mo., and Bolivar. Much of the line is to be re-ballasted and several wooden bridges are to be replaced with steel.

ST. LOUIS, IOWA & DAKOTA.—This company, already incorporated in Iowa, has filed articles of incorporation in Missouri. Of its total \$15,000,000 capital stock, \$1,700,000 is to be used in Missouri. The line as projected is to run from Sioux City, Ia., southeast 512 miles to St. Louis. T. P. Gere, of Sioux City, is President. (Dec. 30, p. 933.)

SAN FRANCISCO & SAN JOAQUIN VALLEY.—Grading was begun May 15 on the connecting line of 1½ miles at Bakersfield, Cal., from the main line to the Southern Pacific tracks near Kern City.

SEABOARD & ROANOKE.—This company, which has already made surveys from Cheraw, S. C., southeast to Columbia to connect with its Florida Central & Peninsular line, is making further surveys, according to report, from Columbia southwest 68 miles, via Aiken, to Augusta, Ga. This line, when completed, would shorten the distance between the two places by some 16 miles.

SEATTLE & MONTANA.—This company was incorporated in Washington March 29, with a capital stock of \$12,500,000, to build a railroad from Vancouver, Wash., north about 250 miles, via Seattle, Everett, Fairhaven and New Whatcom, to Blaine, on the northern boundary. The incorporators are: W. H. Thompson, Walter S. Osborn and Henry W. Lung, of Seattle.

SOUTHEASTERN.—This company has been incorporated in Florida, with a capital stock of \$75,000, to build a railroad from a point on Indian River, near Titusville, Brevard County, to run northwest about 50 miles to Blue Spring, Volusia County, on the St. Johns River. The incorporators are: J. R. Parrott, A. G. Hamlin, J. P. Beckwith, A. V. S. Smith and H. S. Jenison.

SOUTHERN.—Surveys are reported in progress for a branch from Cleveland, Tenn., east about two miles to barytes mines.

SOUTHERN MISSOURI & ARKANSAS.—This company, which was recently incorporated as successor to the St. Louis, Cape Girardeau & Fort Smith (RR. News column, May 12, p. 345) is to build an extension, according to report, from its southern terminus at Hunter, Mo., to run south about 90 miles to Newport, Ark., connecting with the White & Black River Valley. This line will then be utilized as far south as Brinkley, Ark., thence by the Arkansas Midland south to Pine City, 24 miles. From Pine City an extension of about 70 miles will be made south to Arkansas City and eventually to New Orleans.

There will be a branch also from the main line in Lawrence County, in the northern part of the State, to run west about 190 miles, along Strawberry River, through Tellville and Harrison to Fort Smith. It is proposed to bond the road at \$12,500 per mile and to issue an equal amount of stock. It is stated

that surveys are now in progress, and that building will be begun early in the fall.

ULSTER & DELAWARE.—Work is in progress, according to report, in changing the Stony Clove division from narrow to standard gage, which will be completed about June 1.

UNION STATION.—Surveys are completed for this line in Buffalo from Main and Exchange Sts. due east six miles to Winchester. The maximum grades are 1.26 per cent. It is to be all elevated structure. (April 7, p. 254.) The officers are given under Elections and Appointments.

WABASH.—The General Manager writes that his company contemplates laying 80 miles of new 80-lb. rails on the Buffalo Division this summer, beside doing much ballasting. There is no intention, however, of reducing the grades. (May 12, p. 344.)

WHITE PASS & YUKON.—Captain Wallace Langley has completed arrangements to build the narrow-gage line from Taku City to Atlin, N. W. T., in connection with the W. P. & Y. This will enable passengers to reach Atlin in one day from Skaguay. The road is to be about three miles long and will be completed early in June. (May 19, p. 360.)

YORK SOUTHERN.—The Dallastown line, from Dallastown, Pa., to a point on the York Southern, 1.25 miles, was completed and opened May 20. (March 31, p. 236.)

GENERAL RAILROAD NEWS.

ATCHISON, TOPEKA & SANTA FE.—Regarding a suit filed at Topeka, Kan., with reference to the Atlantic & Pacific income bonds, the following official statement is made:

The litigation against the Atchison in respect to Atlantic & Pacific income bonds, which has been pending for the last two years in New York, has recently been transferred to the courts of Kansas, a suit having been commenced at Topeka by one A. P. Lasher, who claims to be the holder of a few A. & P. guaranteed 4 per cent. bonds which he omitted to deposit with the State Trust Co. when the mortgage was foreclosed. Of the bonds of this class only a very small amount remain outstanding, (less than \$200,000 in all.) The committee which represents A. & P. income bonds has intervened in the Lasher suit, which is understood to have been brought to afford them this opportunity. The income bond holders claim a right to redeem against the foreclosure of the A. & P. road which was conducted by the Bangs' committee. That foreclosure is believed to have been perfectly regular.

BALTIMORE & OHIO.—The reorganization managers give notice that the new securities are ready for issue on and after May 24, after which date interest on the coupons maturing prior to July 1, 1898, ceases. The new coupon bonds are in denominations of \$1,000 and \$500 each, and the new shares are of a par value of \$100. Non-interest bearing scrip, exchangeable in round amounts for the new securities, will be issued for fractional amounts of bonds and shares. Holders entitled to fractions of bonds or shares may either buy or sell to the reorganization managers. (May 19, p. 361.)

BOSTON & MAINE.—Full control has been obtained of the Portsmouth & Dover, of N. H., which extends from Portsmouth to Dover, 10.88 miles. It has been leased since its completion in 1874 to the Eastern R.R. of N. H., and guaranteed by the B. & M., at an annual rental of 6% on the \$679,000 capital stock.

CENTRAL VERMONT.—The deed of sale of the Burlington & Lamolite to the C. V., in consideration of \$250,000 in 4% gold bonds, has been filed in the City Clerk's office at Burlington, Vt. That portion of the road between the terminus of the Rutland R.R. at Burlington, and Essex Junction, is not included. (May 12, p. 345.)

CHICAGO & ALTON.—Press reports state that a contract has been signed between this company and the Chicago Terminal Transfer for the use of terminals in Chicago. The Chicago Terminal Transfer not long ago made arrangements with the St. Louis, Peoria & Northern (now the St. Louis & Northern Short Line), and it is understood that this new agreement may have an important bearing on the question of the proposed extension of that property into Chicago.

CHICAGO, BURLINGTON & QUINCY.—At a meeting of the stockholders on May 20, it was decided to absorb as a part of the main system nine companies which have heretofore been operated under lease, the stock of which is, for the most part, owned by the parent company: American Central, 50.63 miles; Peoria & Hannibal, 32.66 miles; Quincy & Warsaw, 39.79 miles; Ottawa, Oswego & Fox River Valley, 67.25 miles; Illinois Grand Trunk, 65.35 miles; St. Louis, Rock Island & Chicago, 285.11 miles; Galesburg & Rio, 12.22 miles; Illinois Valley & Northern, 58.76 miles; Chicago & Iowa, 78.44 miles. This action is in view of the proposed issue of \$85,000,000 bonds to replace old securities. (March 31, p. 237.)

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—The Board of Trustees, which has charge of the interests of the city of Cincinnati in the Cincinnati Southern, leased to the C., N. O. & T. P., has indefinitely postponed action on the proposition of President Spencer, of the Southern, to renew the lease until such time as all cases now pending in the courts shall have been settled. (Jan. 20, p. 55.)

COLUMBUS, HOCKING VALLEY & TOLEDO.—Car trust bonds, series A, to the amount of \$48,000, have been drawn by lot for redemption at par and accrued interest on July 1, at the Atlantic Trust Co., New York.

CLEVELAND, CANTON & SOUTHERN.—Press reports state that the Wheeling & Lake Erie has closed negotiations to buy this property and will issue bonds to cover the purchase. The C., C. & S. was sold at foreclosure Feb. 4 to the bondholders. It embraces 209.42 miles of road, which went into the hands of a receiver Sept. 15, 1893. (Feb. 24, p. 147.)

COLUMBUS, SANDUSKY & HOCKING.—Judge Allen Smalley, at Bucyrus, O., May 20, set aside the sale of this property, made on July 5, 1895, to Sinks & Hatch for \$4,500,000, on the ground that all the payments called for were not made. This action takes the property out of the hands of S. M. Felton, receiver, and places it in the courts of Crawford County, O. (March 3, p. 163.)

ERIE.—This company has bought a controlling interest in the New Castle & Chenango Valley, which it has operated since 1889 under a 99-year lease.

INTERNATIONAL DOCKS.—Proceedings for the dissolution of this company were filed with the New Jersey Secretary of State May 10. The company was incorporated May 5, 1897, to build a railroad from Walker Ave., Jersey City, via the line of the West Side, connecting to Oyster Island in New York Bay. Daniel S. Appleton is Acting Vice President.

KANSAS CITY, PITTSBURG & GULF.—The new reorganization committee, of which Wm. F. Har- rity is chairman, has issued the following notice to holders of securities:

Your committee deem it essential for the preservation of the value of your securities:

First: That the securities covering the main line and the Kansas City and Port Arthur terminals be now merged and consolidated under one management.

Second: That such management be independent and in your interest alone.

Your property is of great value. It has an assured and a very large earning power. Its present financial condition is due to causes familiar to you and which it would be difficult to avoid, even if the work were now to be done over again.

In the consolidation of the system we expect to receive the support of the foreign holders of all of the securities affected. The foreign holdings are, we are informed, a majority of the whole. Pending the preparation of the plan of reorganization, we advise holders to refrain from depositing their securities with any committee in this country. The experience of some of our fellow-bondholders has been that it is easier to deposit bonds than to get them back.

Your committee ask the holders of the securities of the main line of terminal companies to furnish their addresses and the amounts of their respective holdings to the chairman, care of Equitable Trust Company of Philadelphia. They will thereafter be directly and promptly informed when the plan is ready for publication and will be made acquainted with provisions. (May 12, p. 345.)

LONG ISLAND.—August Belmont & Co. and Strong, Sturges & Co., New York, and Lee Higginson & Co., Boston, offer for sale \$4,000,000 of the new 4% 50-year gold bonds recently authorized at 93½ and accrued interest. Of these \$3,500,000 will be used to pay off a floating debt, real estate mortgages and equipment notes, and for improvements now in progress. The remaining \$500,000 is to be used to buy underlying securities of various issues, including \$1,650,000 of similar bonds outstanding. This will make the total issue \$5,650,000. (May 12, p. 345.)

LOUISVILLE, EVANSVILLE & ST. LOUIS.—The receivers have negotiated a loan of \$280,000 receivers' certificates at 3½ per cent. to the First National Bank of Louisville. (March 10, p. 182.)

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—A cablegram from London announces the offering of \$3,500,000 second mortgage 4% 50-year gold bonds of this company, interest guaranteed by the Canadian Pacific, at £196 per \$1,000 bond.

NORTHERN PACIFIC.—Call was made last week for \$232,000 coupon bonds and \$150,000 of registered bonds on the first general mortgage of 1881, at 110 and interest, to the Central Trust Co., interest to cease July 1. (Feb. 3, p. 95.)

PORT ARTHUR, DULUTH & WESTERN.—Sealed tenders will be received up to August 3 by the Master-in-Ordinary at Osgoode Hall, Toronto, Ont., for the purchase of this road, which extends from Port Arthur Ont., to the International boundary line at Gun Flint Narrows, 85½ miles. The terms of the sale are 10 per cent. on acceptance of the tender, and the balance to be paid within one month thereafter, without interest. The tenders will be opened at 11 a. m., August 4.

SEBASTOCOOK & MOOSEHEAD.—W. J. Hayes & Son, of Cleveland, O., have filed a bill in equity in the Supreme Court at Augusta, Me., on \$76,000 first mortgage bonds, asking for a receiver. The road runs from Pittsfield, Me., to Hartland, eight miles. The capital stock is \$126,000 and the funded debt \$50,000.

SOUTHERN.—This company has bought the Carolina Midland which runs from Allendale, S. C., to Seivern, 54 miles, and also the Seivern & Knoxville, running from Seivern to Batesburg, 17 miles. It is stated that these lines are to be used as part of the proposed connecting line between Columbia and Savannah. (C. M., May 5, p. 325; S. & K., May 6, 1898, p. 334.)

SOUTHERN PACIFIC.—The Governor of Texas has signed a bill authorizing the consolidation of the Houston & Texas Central line of the S. P., with the Austin & Northwestern, and other lines in Texas now operated by the S. P. Co. A former bill for a similar purpose was vetoed. (March 24, p. 220.)

WILLIAMSPORT & NORTH BRANCH.—A Pennsylvania press dispatch states that a syndicate composed of S. D. Townsend, of Philadelphia; C. W. Woodrop and B. H. Welch, of Pughsville, Pa.; H. H. Farrier, Jersey City, and Henry C. Adams, of New York, has bought all the bonds and preferred and common stock of the Taylor Satterfield estates of Buffalo, N. Y., amounting to over \$2,000,000 of the total issues of \$1,225,000 and \$1,125,000. This line extends from Hall's Pa., to Satterfield, 44.4 miles, with a branch from Birch Creek to Bernice, six-tenths mile. (For new officers see Elections and Appointments.)

WISCONSIN CENTRAL.—The first installment of 25% each on income bonds, preferred and common stock under the reorganization plan is called for payment on or before June 3. (May 12, p. 345.)

TRAFFIC.

Traffic Notes.

It is reported from Providence that regular steamers are to be run between that city and New York by the New Haven Steamboat Co.

The strike of grain shovellers at Buffalo was settled on Tuesday of this week, but not until it had inflicted very costly delays on scores of vessels and advanced lake freights from Chicago eastward.

Nearly or quite all of the railroads in the South-eastern Car Service Association have agreed to charge demurrage on cars containing cotton for export. Heretofore this class of freight has been exempt from demurrage rules and cars have frequently

stood under load a month or two. It is now proposed to limit the free time to 10 days.

The Long Island Railroad, which not only carries bicycles free, as required by the law of New York, but also takes special pains to invite bicyclists to use its trains, is finding that its generosity is being imposed upon, and it has been necessary to issue an order making a storage charge on wheels left in baggage rooms more than two hours.

The Texas Legislature has recently passed a law forbidding discrimination in rates for transportation by railroad, and the San Antonio & Aransas Pass has notified agents and conductors that, under this law, free passes will be illegal. It is said that the members of the Legislature, in passing the law, did not realize that they were imposing such a severe restriction.

The separate car law of North Carolina goes into effect June 1, the State Corporation Commission, acting under a clause in the law, having issued an order naming this date. The through trains on the principal railroads are exempt from the requirements of this law, and also the whole of the trains of some of the less important lines, on which travel is very light.

It is reported in Southern papers that the ticket scalpers of Jacksonville, Fla., finding themselves stocked with a large number of return coupons of winter tourist tickets from the North, which were likely to expire on their hands, sent a man to Big Rapids, Mich., who, writing from that place, in the name of the individual purchaser of each ticket, applied to the issuing roads for redemption of the coupons, giving in each case a plausible reason for not having used the ticket. It is said that Chairman Richardson of the Southeastern Passenger Association discovered the trick and notified all of the roads.

Fruit dealers in California are complaining loudly at the increase in the rates for the use of refrigerator cars recently announced by the Southern Pacific. The minimum carload weight has also been increased from 12 tons to 13. It appears that in past years competing lines of ventilated or refrigerator cars have reduced the rates, but now the competitors appear to have arranged an agreement or consolidation and the price of a refrigerator car to New York is \$120, which has to be added to the regular freight rate. From points in Oregon, by the Northern transcontinental lines, the refrigerator rate is only one-half this amount.

Chicago Traffic Matters.

Chicago, May 24, 1899.

General passenger agents of the roads west of Chicago are little nearer a common point for a reorganized association than they were a week ago, or three weeks ago, for that matter. From a discussion of a new general agreement the work of the meetings has drifted into a consideration of Immigrant Clearing House affairs. The Union Pacific has turned things upside down in the Immigrant Clearing House by its independent dealings with Peter McDonald, and its arbitrary position as to the proper interpretation of immigrant business, that is, what is and what is not immigrant business. Mr. Lomax insists that second class business is not immigrant traffic within the meaning of the Clearing House, even if the passengers do come to this country in the steerage. It seems that McDonald has been working in Europe ticketing passengers as second class, regardless of their ocean class, and claiming the original booking of second class in Europe takes them out of the jurisdiction of the Clearing House here. The passenger men have been wrangling over this point for a week and probably will wrangle for another week with the same result. In the meantime Chairman Caldwell of the Immigrant Clearing House is not giving the Union Pacific its allotted percentage of the business that passes through the Clearing House on the ground that it is getting more than its share by its dealings with McDonald, besides violating the rules of the organization. There is some talk of making the Clearing House a separate organization; that is, divorcing it entirely from the Western Passenger Association.

It is said that the railroads are offering to take corn to the seaboard at the same rate as that made by the lake and rail lines, which means about 5½ cents a bushel, or, say, 10 cents per 100 lbs. This situation is due to the tie-up at Buffalo, owing to the strike there. No tariffs have been issued, but shippers have been notified that such rates will be made, if it is necessary to move grain to the seaboard to meet ocean engagements.

Wholesalers and shippers in the Chicago district and at distributing centers in the West are protesting vigorously at the advance in the minimum carload weights on roads west of Chicago. The minimum carload weights have been raised on an average from 24,000 to 30,000 pounds. The advance was made on a recommendation of the Western Classification Committee. The Great Northern and the Northern Pacific, however, have not yet joined in the advance. Executive freight officers of these two lines will meet in St. Paul this week to consider the question. At this meeting a delegation of Chicago shippers will be given an opportunity to air their grievances. The shippers hope to block the advance by getting these two lines to refrain from joining the other roads in the move.

At a meeting of the general baggage agents of the roads of the Western Passenger Association in this city the proposition to change the plan of selling excess baggage coupons was voted down, only three lines out of about twenty-five represented voting in favor of a shift. It has been proposed to do away with the present excess baggage coupon books that are sold \$12.50 worth for \$10, and replace them with the credit system, that is to have the patron pay full excess rates for his excess and when he had accumulated \$25 worth of receipts turn them in to the chairman of the Western Passenger Association and receive a \$5 rebate.

The contract between the Pullman Company and the Delaware, Lackawanna & Western road expired May 1 and has not yet been renewed. A lively contest is on between the Pullman and Wagner people for the Lackawanna's new contract.

The report that the Chicago & Alton is to change its local terminals from the Union to the Grand Central station of the Chicago Terminal Railroad Transfer Company has been revived, but the officers of the Alton know nothing of any contemplated change. In the Union station the Alton has one of the best terminals in Chicago and a change to the Fifth avenue station would be a step down. This station, while a magnificent affair in itself, is in an unfavorable location.